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United States
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National Forest



September 2003

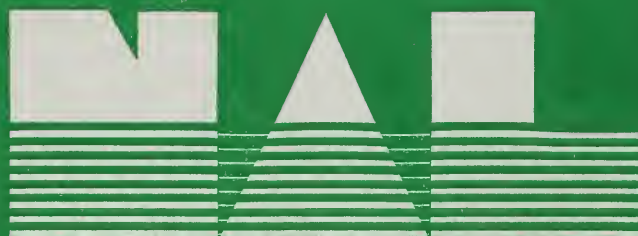
Draft Environmental Impact Statement

Emigrant Wilderness Dams

Stanislaus National Forest
Summit Ranger District
Tuolumne County, California



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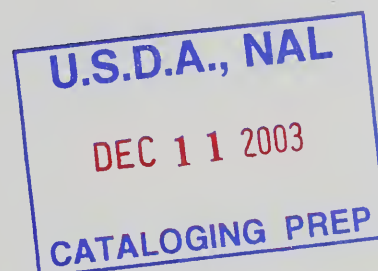
Emigrant Wilderness Dams Draft Environmental Impact Statement

**Stanislaus National Forest
Summit Ranger District
Tuolumne County, California**

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Abstract

The Stanislaus National Forest proposes to reconstruct, repair, maintain, and operate 12 dams in the Emigrant Wilderness. The Forest also proposes not to maintain six dams that would be allowed to deteriorate naturally. The 12 dams are: Snow, Bigelow, Huckleberry, High Emigrant, Emigrant Meadow, Emigrant Lake, Cow, Leighton, Long, Lower Buck, and Y-Meadow. The six dams include Horse Meadow, Red Can, Yellowhammer, Bear, Cooper, and Whitesides. The draft EIS also assesses the potential impacts of two alternative scenarios. Alternative 2 (No Action) allows all 18 dams to deteriorate naturally. Alternative 3 emphasizes the repair and maintenance of the seven dams eligible for inclusion on the National Register of Historic Places. The seven dams are Bigelow, Emigrant Meadow, Emigrant Lake, Red Can, Leighton, Long, and Lower Buck. The remaining eleven dams would be allowed to deteriorate naturally under Alternative 3. Alternative 1 is the preferred alternative.

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E-mail Comments to: comments-pacificsouthwest-stanislaus@fs.fed.us [Subject: Emigrant Dams]

Comments Must Be Received: 45 day comment period starts the day after the Environmental Protection Agency publishes a Notice of Availability for the draft EIS in the Federal Register, expected on September 8, 2003.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. City of Angoon v. Hodel (9th Circuit, 1986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

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Chapter 1 – Purpose of and Need for Action

1.1. DOCUMENT STRUCTURE

The Forest Service has prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters:

Chapter 1 – Purpose and Need for Action: The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Chapter 2 – Alternatives, Including the Proposed Action: This chapter provides a more detailed description of the agency's proposed action, as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

Chapter 3 – Affected Environment and Environmental Consequences: This chapter describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area.

Chapter 4 – Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the EIS.

Appendices: The appendices provide detailed information to support the analysis presented in the EIS.

Index: The index provides page numbers by document type.

1.2. BACKGROUND

The Wilderness Act of 1964 established the National Wilderness Preservation System "to secure for the American people of present and future generations the benefits of an enduring resource of wilderness."

On January 3, 1975, Public Law 93-632 (Section 2(b)) designated 106,988 acres as Emigrant Wilderness. At that time, 18 water control structures existed and they were recognized in the Congressional Record. Various human uses, such as recreation, grazing, and mining, are allowed by the Wilderness Act, but all activities will be managed or carried out subordinate to the higher purpose of maintaining wilderness values. These overriding values are 1) outstanding opportunities for solitude and 2) the ability of natural processes to operate free of human influence. On September 28, 1984, Public law 98-425 designated an

additional 6,100 acres as part of the Emigrant Wilderness. Congress, which often includes what the disposition of the non-conforming structures and uses should be, did not address the Emigrant Wilderness dams in either Act.

The Emigrant Wilderness borders include Yosemite National Park on the south, the Toiyabe National Forest on the east, and State Highway 108 on the north. The Emigrant Wilderness is an elongated area that trends northeast about 25 miles in length and up to 15 miles in width. Watersheds drain to the Stanislaus and Tuolumne rivers. The Wilderness is entirely within Tuolumne County (Map D-1-1).

The Emigrant Wilderness contains over 100 named lakes¹ (77 of which have been historically stocked with trout) which is one of the highest ratios of lakes per wilderness unit in the Sierra Nevada. Of the original 18 water control structures, 15 are associated with lakes. All of these, with the exception of Y-Meadow, impound water on naturally existing lakes. Y-Meadow inundated an existing stream and riparian habitat to create a new lake.

Three types of dams exist in the Emigrant Wilderness. Twelve structures are streamflow augmentation dams, three are lake level structures, and three are meadow enhancement structures with no lakes:

1. Streamflow Maintenance Dams (12): The intent of these dams is to increase downstream flow during dry weather in late summer or early fall. These dams raise the height of natural lakes from about 6 to 10 feet (the exception is one 25-foot dam that inundates a former meadow). Each has a small gate valve to regulate streamflow releases. The 12 streamflow augmentation dams are:

Snow Lake Dam	Emigrant Lake Dam
Bigelow Lake Dam	Leighton Lake Dam
Huckleberry Lake Dam	Long Lake Dam
High Emigrant Lake Dam	Lower Buck Lake Dam
Emigrant Meadow Lake Dam	Y-Meadow Dam
Middle Emigrant Lake Dam	Bear Lake Dam

2. Lake Level Dams (3): These dams add approximately three feet of height to existing natural lakes, but do not regulate downstream flows. They include:

Cow Meadow Dam
Red Can Dam
Yellowhammer Dam

3. Meadow Maintenance Dams (3): These are small structures located in stream channels at the lower end of meadows. The intent of these dams is to raise the water table to sub-irrigate the meadows. No lakes are associated with these dams. They include:

Horse Meadow Dam
Cooper Meadow Dam
Whitesides Meadow Dam

¹ The Emigrant Wilderness contains over 500 small, unnamed lakes.

1.3. PURPOSE AND NEED FOR ACTION

The Forest Service needs to make a final decision on maintaining or not maintaining 18 dams. The following items contribute to generating the purpose and need (why here and why now) for the proposed action to maintain 12 and not maintain 6 dams:

1. Controversy
2. Planning History
3. Social/Cultural Values
4. Forest Plan Direction
5. California Department of Fish and Game (CDFG)/Forest Service Joint Strategy

1.3.1. Controversy

Controversy surrounding management of the Emigrant Wilderness dams resulted in recent Congressional consideration of legislation related to the Emigrant dams. No specific legislation has been enacted. The Forest Service has conducted several planning efforts related to the disposition of the dams since designation of the Emigrant as Wilderness. Public and legislative requests have been received to maintain, repair, and operate twelve of the dams. No maintenance has occurred since 1989 due to appeal decisions on previous planning efforts. There is a need to resolve this continuing controversy.

1.3.2. Planning History

In 1931, the Forest Service designated this area for primitive management as the Emigrant Basin Primitive Area. At this time, the Forest Service policy for Primitive area designation focused on highest public use. Areas set aside as "Primitive" were done so because of "recognition of the appeal and benefits to the public seeking such environments for recreation."

Following legislative designation as a Wilderness in 1975, an "Emigrant Wilderness Management Plan", prepared in 1979, contained a requirement for a study to determine "...the condition, value and cost-effectiveness of the various [water control structures] as well as their effects on the natural hydrological processes." The following charts the evolution of the Emigrant Wilderness planning process.

- | | |
|------------|--|
| 1986-1988 | The Stanislaus National Forest conducted the required study from the 1975 Management Plan. |
| Nov. 1989 | The Stanislaus Forest Supervisor signed a Decision Notice that called for retaining 12 dams and phasing out 6. This decision was appealed. |
| April 1990 | The Regional Forester reversed the Forest Supervisor's decision and required removal of all dams within five years. |
| May 1990 | The Regional Forester amended the appeal decision and allowed the Forest to review the analysis and issue a new decision if new information was available. |

- October 1991 The Stanislaus National Forest Land and Resources Management Plan was approved. This plan directed the Stanislaus National Forest to develop a new Emigrant Wilderness Management Plan¹.
- 1993 The Forest Supervisor decided to incorporate the disposition of the dams into the Emigrant Wilderness Management Direction EIS.
- April 1998 The Forest Supervisor signed the Emigrant Wilderness Management Direction EIS and Record of Decision (ROD). The decision allowed for the maintenance of eight dams. Of the eight, six would not be allowed to have the streamflow valves operational. This decision was appealed.
- October 1999 The Regional Forester reversed the Forest Supervisor's decision on the maintenance of the dams. Currently, no site-specific management direction is in place for the dams.

The Emigrant Wilderness Management Direction (April 2002) presents the current Management Direction for the Emigrant Wilderness, based on the Forest Plan Amendment as modified through the appeal process. There is a need for site-specific direction for management of the dams.

1.3.3. Social and Cultural Values

Prior to fish stocking by cattlemen in the Emigrant area during the 1890s, high elevation lakes were naturally fishless. Most of the water control structures in the Emigrant Wilderness were constructed in the 1920s and 1930s to develop a resident fishery. The original intent of most of the dams was to augment downstream flows for fish habitat enhancement. The remaining water control structures were built as late as 1951. These dams are composed mostly of rock and mortar (with the exception of one earth-fill dam). Because of the age, condition, and historical associations of some dams, seven are eligible for the National Register of Historic Places.

Early maintenance and operation of the dams appears to have been shared primarily by the Forest Service, CDFG, sportsmen's clubs, and other groups. In an October 1956 article in *Outdoor California*, it is mentioned that a maintenance inspection trip included officials from the Forest Service, CDFG, California State Chamber of Commerce, and the Sierra Club.

The Forest Service and the CDFG shared maintenance of the Emigrant dams during the 1970s and 1980s. CDFG had a special use permit for the maintenance and operation of 11 dams² from 1965 through 1988. Due to budget and resource limitations, CDFG did not renew the permit after 1988. Operation of the streamflow releases has been done primarily by CDFG. Specific lake-by-lake fisheries management decisions are made between the Stanislaus National Forest and CDFG through a local Memorandum of Understanding. There is a need to address social and cultural values associated with recreational fisheries and historical resources.

¹ The Stanislaus National Forest "Forest Plan Direction" presents the current Forest Plan management direction, based on the original Forest Plan as modified through the Forest Plan appeals process and Forest Plan amendments.

² Bigelow, Cow Meadow, Emigrant, Emigrant Meadow, High Emigrant, Huckleberry, Leighton, Long, Lower Buck, Middle Emigrant, and Snow dams.

1.3.4. Forest Plan Direction

The following sections list applicable Forest Goals, Management Emphases, and Standards and Guidelines from the current Forest Plan.

1.3.4.1. FOREST GOALS

Manage Wilderness to preserve its character and values and to allow recreational, scenic, scientific, educational, conservation and historic uses consistent with these objectives.

Within the Emigrant Wilderness:

- Maintain and perpetuate the enduring resource of wilderness as one of the multiple uses of National Forest System land.
- Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces.
- Minimize the impact of those kinds of uses and activities generally prohibited by the Wilderness Act, but specifically excepted by the Act or subsequent legislation.
- Protect and perpetuate wilderness character and public values including, but not limited to, opportunities for scientific study, education, solitude, physical and mental challenge and stimulation, inspiration, and primitive recreation experiences.
- Gather information and carry out research in a manner compatible with preserving the wilderness environment to increase understanding of wilderness ecology, wilderness uses, management opportunities, and visitor behavior.

1.3.4.2. MANAGEMENT EMPHASIS

Management emphasis, within the Emigrant Wilderness, is to ***move the Wilderness as a whole toward a more pristine condition*** by maintaining some areas and moving others to a more pristine Opportunity Class designation.

1.3.4.3. STANDARDS AND GUIDELINES

- Maintenance of water impoundment structures will be consistent with the USDA Forest Service/CDFG Joint Strategy (see Section 1.3.5.).
- No maintenance activities will occur until site-specific analysis is completed and a determination is made as to whether the structure is necessary to meet the minimum requirements for the administration of the area as wilderness.
- Dams without a high enough value to warrant retention should be allowed to deteriorate naturally (no maintenance) consistent with FSM direction, rather than removed. If a safety concern dictates removal, conduct the appropriate level of analysis to determine removal method.

There is a need to implement the Forest Plan

1.3.5. CDFG/FS Joint Strategy

On November 8, 2000, the Regional Forester and the CDFG Director developed a joint strategy to work cooperatively on site-specific analysis and additional data collection for future management of the dams. It should be noted the Joint Strategy did not make a

decision to maintain or not maintain dams, but it established a cooperative framework for future management decisions (Table 1-1 below and Appendix A).

Table 1-1 Summary of Joint Strategy

Maintenance may be Warranted Pending Site-specific Analysis		Additional Data Needed to Determine if Maintenance is Warranted	No Maintenance Needed for Fisheries
Long Lower Buck Leighton Emigrant Meadow	Middle Emigrant Emigrant Bigelow Huckleberry	High Emigrant Cow Meadow Snow Y-Meadow	Yellowhammer Whitesides Horse Meadow Bear Cooper Red Can

There is a need to move forward on the Joint Strategy.

1.4. PROPOSED ACTION

The Stanislaus National Forest proposes to reconstruct¹, repair, operate, and maintain 12 dams in the Emigrant Wilderness. Because no special funding is expected for this project, implementation depends upon obtaining funds other than normal Forest Service appropriated dollars. Maintenance and repair work would be accomplished through appropriate third party authorizations such as volunteer agreements, special use permits, Memorandum of Agreements, etc.

The Forest also proposes not to maintain six dams. These dams would be allowed to deteriorate naturally in order to restore natural processes. Table 1-2 provides a listing of the dams proposed to be maintained and not maintained, and identifies the initial maintenance activities.

Reconstruction, repair, and standard maintenance would be completed using minimum tool and pack-it-in/pack-it-out philosophy. The use of native materials from the immediate vicinity would be utilized whenever possible. No mechanized or motorized equipment would be used (only hand labor) and materials would be packed in using livestock. Any temporary access routes to project sites would be designated by the Forest Service and decommissioned immediately following completion of the work. All activities would be conducted according to existing Forest Service law, regulation, policy, and direction (e.g. group size limits and campfire restrictions).

Standard maintenance of the 12 dams would also include, but not be limited to, log removal if the integrity of the structure were threatened, mortar replacement on the upstream face of the structure, and minor rock replacement.

Because no special funding is expected for this project, implementation would depend upon obtaining funds other than normal Forest Service appropriated dollars. Maintenance and

¹ Cow Meadow's main dam is the only dam that would be reconstructed, as it no longer exists. The remainder of the document will not make a distinction between reconstruct and repair.

reconstruction would depend on funding and participation from interested partners, permittees, volunteers, etc.

It is estimated the administrative cost to the Forest Service would be \$2,755 for each dam, therefore; the Proposed Action's administrative cost would be approximately \$33,060. See Section 3.11 for assumptions.

1.5. DECISION FRAMEWORK

1.5.1. Decision to be Made

Given the purpose and need, the deciding official reviews the proposed action, the other alternatives, and the environmental consequences in order to decide which dams shall be maintained and which shall be allowed to deteriorate naturally. The responsible official may decide to: (1) select the proposed action, (2) select one of the alternatives, (3) select one of the alternatives after modifying the alternative with additional mitigating measures or combination of activities from other alternatives, or (4) select the no action alternative, choosing to take no action at this time.

1.5.2. Responsible Official

The Forest Supervisor for the Stanislaus National Forest is the Responsible Official who will decide what actions are to be implemented to either maintain or not maintain 18 dams in the Emigrant Wilderness. The Forest Supervisor will document decisions and rationale in a Record of Decision. The responsible official should consider the following questions when making the final decision:

- How well does it meet law, policy, and the Forest Plan?
- How well does it meet the "minimum necessary for the management of wilderness for wilderness purposes?"
- How well does it move the wilderness, as a whole, towards a more pristine condition?
- How well does it meet the FS/CDFG Joint Strategy?
- How well does it meet legislative intent?

1.5.3. Project Implementation

Once approved, project implementation could begin in the summer of 2004 as funding and participation from interested partners and volunteers develops.

Table 1-2 Summary of the Proposed Action

Dams ¹	Type ²	Proposed Action		Initial Activities ³
		Maintain	Not Maintain	
Cherry Creek Watershed – East Fork Cherry Creek				
Snow	SA	✓		<ul style="list-style-type: none">▪ Replace outlet slide-gate, control stem, control wheel, and sleeve outlet conduit.▪ Seal mortar on upstream and downstream face
Bigelow*	SA	✓		<ul style="list-style-type: none">▪ Replace slide-gate and frame, outlet valve, control shaft/wheel, and sleeve outlet conduit▪ Replace missing rocks▪ Seal mortar on upstream face
Horse Meadow	MM		✓	None
Huckleberry	SA	✓		<ul style="list-style-type: none">▪ Replace outlet valve, control shaft/wheel, and sleeve outlet conduit▪ Replace missing rocks▪ Seal mortar on upstream face
Cherry Creek Watershed – North Fork Cherry Creek				
High Emigrant	SA	✓		<ul style="list-style-type: none">▪ Replace outlet valve, control shaft/wheel, and sleeve outlet conduit▪ Rebuild outlet control works well shaft▪ Seal mortar on upstream face
Emigrant Meadow*	SA	✓		<ul style="list-style-type: none">▪ Replace outlet valve▪ Replace control shaft/wheel▪ Insert plastic pipe into existing outlet conduit▪ Seal mortar on upstream face
Middle Emigrant	SA	✓		<ul style="list-style-type: none">▪ Rebuild failed left side of dam▪ Insert plastic pipe into existing outlet conduit▪ Replace outlet valve▪ Seal mortar on upstream face
Emigrant Lake*	SA	✓		<ul style="list-style-type: none">▪ Stabilize mortar downstream face of dam▪ Repair spillway dike▪ Seal mortar on upstream face
Cow Meadow	LL	✓		<ul style="list-style-type: none">▪ Reconstruct entire main dam

¹ Dams marked with an asterisk are eligible for the National Register of Historic Places.

² SA – Streamflow Augmentation, MM – Meadow Maintenance, LL – Lake Level

³ Repairs on dams eligible to the NRHP would follow the Secretary of the Interiors Standards for Treatment of Historic Properties 36 CFR 68. Repair or replacement materials would be in-kind when possible. Plastic pipe used as a conduit insert would be unseen and of black material which blends into the background.

Dams ¹	Type ²	Proposed Action		Initial Activities ³
		Maintain	Not Maintain	
Cherry Creek Watershed – Middle Fork Cherry Creek				
Red Can*	LL		✓	None
Leighton*	SA	✓		<ul style="list-style-type: none">▪ Replace outlet valve, control shaft/wheel, and sleeve outlet conduit▪ Disassemble and rebuild dam▪ Construct control works well shaft▪ Seal mortar on upstream face
Yellowhammer	LL		✓	None
Cherry Creek Watershed – West Fork Cherry Creek				
Long*	SA	✓		<ul style="list-style-type: none">▪ Replace outlet valve, control shaft/wheel, and sleeve outlet conduit▪ Repair control works well shaft▪ Seal mortar on upstream face
Lower Buck*	SA	✓		<ul style="list-style-type: none">▪ Replace outlet valve, control shaft/wheel, and sleeve outlet conduit▪ Log removal▪ Seal mortar on upstream face
Clavey River Watershed – Lily Creek				
Y-Meadow	SA	✓		<ul style="list-style-type: none">▪ Replace outlet valve, control shaft/wheel, and sleeve outlet conduit▪ Seal mortar on upstream face
Bear	SA		✓	None
South Fork Stanislaus River Watershed – South Fork Stanislaus River				
Cooper Meadow	MM		✓	None
Whitesides Meadow	MM		✓	None

1.6. PUBLIC INVOLVEMENT

In an effort to reach interested individuals and organizations, approximately 120 letters were mailed on January 31, 2003 to request comments on the Proposed Action. The Notice of Intent (NOI) was published in the Federal Register on February 3, 2003¹. The NOI asked for public comment on the proposal through March 5, 2003, although comments were accepted well beyond that date. In addition, a press release was issued on February 7, 2003 regarding the Proposed Action and the comment period. Lastly, this project was published in the Forest's Schedule of Proposed Actions beginning with Issue 93 in December 2002, and has continued to be published in Issues 94 (March 2003), 95 (June 2003), and 96 (September 2003). Over 95 responses were received via email, telephone, and regular mail because of this effort. Using the comments from the public and other agencies, the interdisciplinary team developed a list of issues to address.

1.7. ISSUES

The Forest Service has separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already determined through law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; 4) conjectural and not supported by scientific or factual evidence; or 5) general comment. The Council on Environmental Quality (CEQ) NEPA regulations explains this delineation in Section 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record. The Forest Service identified the following significant issues during scoping:

1.7.1. Natural Processes

Repairing, maintaining, and operating dams in the Emigrant Wilderness may alter (or have already altered) natural processes including streamflow regimes and natural lake levels, as well as modify vegetation, wildlife habitat, riparian areas, and the like. This disturbance to natural processes could violate the spirit and intent of the Wilderness Act under which the Emigrant Wilderness is managed (P.L. 88-577, 16 USC 1131-1136, September 3, 1964). The Wilderness Act defines a Wilderness as "...an area where the earth and its community of life are untrammeled by man" and "...an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions..." (Section 2(c)). Alternative 2 responds to this issue.

¹ Federal Register, Volume 68, Number 22, page 5267-5269.

1.7.2. Amphibians

Repairing, maintaining, and operating dams in the Emigrant Wilderness may damage habitat needed for amphibians such as the Yosemite toad and mountain yellow-legged frog. Both the toad and frog have been proposed for listing as Endangered under the Federal Endangered Species Act. On January 16, 2003, the U.S. Fish & Wildlife Service prepared a Notice of 12-month Petition Finding that stated, "... the petitioned action is warranted, but precluded by higher priority actions..."¹ The Stanislaus National Forest Land and Resource Management Plan states "Modify or mitigate projects where necessary to avoid adverse impacts to habitats for species which are candidates or proposed for listing (Forest Plan Direction, 2002, p. 37). Alternative 2 responds to this issue.

1.7.3. Heritage Resources

There is a concern for balancing the preservation of dams eligible for the National Register of Historic Places and the protection of the wilderness resource. Although seven dams are eligible, there may not be a need to repair and maintain all of them in order to meet the National Historic Preservation Act (Public Law 89-665; 16 U.S.C. 470). Alternative 3 responds to this issue.

1.7.4. Wilderness Character (Minimum Necessary)

Repairing, maintaining, and operating dams in the Emigrant Wilderness may detract from the values, experiences, and character associated with the wilderness. The very existence of the dams may diminish the experiences a visitor comes to the wilderness to enjoy, such as viewing a natural environment. Allowing for the continued existence of dams may not be the minimum necessary for the administration of the wilderness. There is also a concern that repairing, maintaining, and operating dams in a wilderness area may not meet the intent of the Wilderness Act which defines wilderness as an area "...without permanent improvements or human habitation" (Section 2(c)). Alternative 2 responds to this issue.

1.7.5. Social and Economic

There is a concern that not repairing, maintaining, and operating all of the dams may detrimentally affect the social values and activities associated with the wilderness area. There is an extensive history of local individuals and organizations taking an active role in maintaining and operating the dams. If the dams did not exist, this activity would be unnecessary and the social history associated with the dams would be lost.

There is also a concern that the loss of any dams would negatively influence the local recreation-based economy. If the dams are not present, there may be fewer visitors entering the wilderness because there may be less water in the lakes. Less water in the lakes could mean less fish for anglers.

Alternatives 1 and 3 responds to this issue.

¹ Federal Register, Volume 68, Number 11, pages 2283-2203 (MYLF) and Volume 67, Number. 237, pages 75834-75843 (YT).

Chapter 2 – Alternatives, Including Proposed Action

2.1. INTRODUCTION

This chapter describes and compares the alternatives considered for the management of Emigrant Wilderness dams. It includes a description of each alternative considered. This section also presents the alternatives in comparative form, showing the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (e.g. to maintain a dam or not maintain a dam) and some of the information is based upon the environmental, social, and economic effects of implementing each alternative (e.g. the amount of riparian meadow restored).

2.2. ALTERNATIVES CONSIDERED IN DETAIL

The Forest Service developed three alternatives, including the No Action and the Proposed Action alternatives, in response to issues raised by the public.

2.2.1. Alternative 1 – Proposed Action

The Proposed Action includes the repair, maintenance, and operation of 12 dams in the Emigrant Wilderness. Six dams would not be maintained or operated and would be allowed to deteriorate naturally. See Map D-2-1.

Dams Maintained		Dams Not Maintained
Snow	Emigrant	Horse Meadow
Bigelow	Cow	Red Can
Huckleberry	Leighton	Yellowhammer
High Emigrant	Long	Bear
Emigrant Meadow	Lower Buck	Cooper Meadow
Middle Emigrant	Y-Meadow	Whitesides Meadow

For all dams, repair and maintenance would be completed using minimum tool and pack-it-in/pack-it-out philosophy. Mechanized or motorized equipment would not be used, materials would be packed in using livestock, and hand labor would be used for all work proposed. Use of helicopter or wheeled-equipment may be considered on a case-by-case basis using minimum tool determinations. All activities would be conducted according to existing Forest Service law, regulation, policy, and direction (e.g., group size limits, campfire restrictions, and in accordance with the National Historic Preservation Act and Secretary of Interior's Standards for historical structures).

For many dams, the lake would need to be lowered in order to complete the repair and maintenance work. The lowering of a lake could be done by draining through valves that are in working order at the streamflow maintenance dams, siphoning at dams where the valves are not operational or where valves do not exist, or with cofferdams.

Maintenance of the 12 dams would include, but not be limited to, log removal, mortar replacement, and minor rock replacement. Although maintenance may occur regularly, current maintenance needs are described dam-by-dam in the following section.

The restoration of 50-100 feet of the channel downstream of Dam Unit #7 on Long Lake has been dropped from the Proposed Action. After further review it was determined the area will recover by allowing natural processes to proceed. This part of the proposal was described in the Notice of Intent published in the Federal Register on February 3, 2003 and in the January 31, 2003 scoping letter.

The following section provides specific repair and maintenance needs for each of the dams proposed to be operated in this alternative.

- **Maintenance** = Routine activities such as log removal, minor rock replacement, etc.
- **Repair** = Activities necessary to restore the structure to its original full functioning such as valve replacement, slide-gate replacement, etc.
- **Reconstruction** = Rebuilding structure that no longer exists, or requires full dismantling to recreate it. This applies to Cow Meadow dam only.

It should be noted that six of the lakes actually contain a series of dams, not just a single dam. Horse Meadow has 2 dams, Cow Meadow has 4 dams, Bigelow Lake has 5, Huckleberry Lake has 7, Long Lake has 8, and Snow Lake has 12 dams.

Snow Lake Dams

Repair

The outlet slide-gate, control stem, and control wheel would be replaced. If the outlet conduit is 12-inches in diameter, then a 10-inch PVC sleeve conduit inside the original conduit would be added. The existing valve would be replaced with a 10-inch gate valve. If the outlet conduit is 10-inches in diameter or smaller, only the gate valve and control mechanism would be replaced with one of the same size.

Maintenance

All the dams would have old loose mortar scaled off and replaced with new mortar on the upstream faces to reduce leakage and on the downstream faces to stabilize loose rocks. The mortar would be prepared with on-site sand. Cement and lime delivered to the site

would be mixed with the sand in a ratio of nine parts sand to two parts cement to one part lime. The estimated quantity of mortar needed, estimated at ½-inch average thickness, is:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	40	4.5	180	8	6	1.3	0.7
2	1	8	8	0	0	0.0	0.0
3	15	8	120	5	4	0.8	0.4
4	12	3	36	2	2	0.3	0.2
5	1	8	8	0	0	0.0	0.0
6	40	5	200	8	6	1.3	0.7
7	18	5	90	4	3	0.7	0.3
8	25	4.5	113	5	4	0.8	0.4
9	62	8	496	21	16	3.5	1.8
10	15	1.5	23	1	1	0.2	0.1
11	3	1	3	0	0	0.0	0.0
12	18	1	18	1	1	0.2	0.1
Total			1,295	55	43	9.1	4.7

Missing rocks on both faces of all dams would be replaced as needed. It is estimated that 100 6-inch to 18-inch rocks would be needed. Mortar, to stabilize rock emplacement, would also be needed. Logs floating in the reservoir near the dam would be removed.

Snow Lake Dams Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	49	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	100	NA	NA	NA	NA	NA
Cement	94 lb. bags	9	5	50	45	450	495
Lime	94 lb. bags	5	5	50	25	250	275
Bentonite	50 lb. bags	2	5	50	10	100	110
Gate Valve, 10" w/ 8' frame	Assy	1	500	100	500	100	600
PVC, 10" dia., Sch 40, 8' long	Pipe	1	100	100	100	100	200
Totals					680	1,000	1,680

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	15	500	7,500

Total Estimate

9,180

Bigelow Lake Dams

Repair

The old, discarded, rusted, and bent slide-gate valve found near the main dam suggests the existing slide-gate valve assembly is a replacement of an earlier, perhaps original, valve. If so, it is estimated the current outlet works is 25 years old. The present slide-gate valve stem and wheel is corroded to the extent that current operability is questionable. To restore the functionality of the outlet works to its original condition would require:

- Replacing the slide-gate and frame
- Sleeving the inside of the 12-inch diameter, eight-foot steel conduit with 10-inch diameter, eight-foot schedule 40 PVC
- Sealing the space between the two pipes with bentonite or equivalent sealing material

The original design drawings indicate the slide-gate valve is 12-inch diameter with a nine-foot frame. The replacement slide-gate valve should be 10-inch diameter with a nine-foot frame.

Maintenance

The main dam (dam 3) and two additional dams (1 and 5) would have their upstream faces resealed with a sand mortar mix. The mortar would be prepared with on-site sand. Cement and lime delivered to the site would be mixed with the sand in a ratio of nine parts sand to two parts cement to one part lime. The quantity of mortar needed, estimated at an average applied thickness of ½-inch, is:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	130	5	650	27	20	5	2
3	81	8	648	27	20	5	2
5	74	4	296	12	9	2	1
Total			1,594	66	49	12	5

Five to 10 missing rocks would be replaced on the downstream face of the main dam. Mortar would be used to stabilize the emplacement of these rocks.

Bigelow Lake Dams Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	49	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	10	NA	NA	NA	NA	NA
Cement	94 lb. bags	12	5	50	60	600	660
Lime	94 lb. bags	5	5	50	25	250	275
Bentonite	50 lb. bags	2	5	50	10	100	110
Gate Valve, 10" w/ 9' frame	Assy	1	500	100	500	100	600
PVC, 10" dia., Sch 40, 8' long	Pipe	1	100	100	100	100	200
Totals					695	1,150	1,845

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	10	500	5,000

Total Estimate

6,845

Huckleberry Lake Dams*Repair*

None proposed.

Maintenance

All the dams would have their upstream faces resealed with a sand mortar mix. The mortar would be prepared with on-site sand. Cement and lime would be delivered to the site and would be mixed with the sand in a ratio of nine parts sand to two parts cement to one part lime. The quantity of mortar needed, estimated at an average applied thickness of ½-inch, is:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	50	2	100	4.2	3.2	0.7	0.4
2	15	2	30	1.3	1.0	0.2	0.1
3	15	2	30	1.3	1.0	0.2	0.1
4	10	2	30	0.8	0.6	0.1	0.1
5	11	3	33	1.4	1.1	0.2	0.1
6	8	2	16	0.7	0.5	0.1	0.1
7	4	2	8	0.3	0.2	0.1	0.0
Total			237	10.0	7.6	1.6	0.9

Missing rocks in the four-foot section of Dam 2 would be replaced, as well as in miscellaneous locations in Dam 3. It is estimated this would take 30-50 rocks for both dams. Mortar would be used to stabilize the emplacement of these rocks.

Huckleberry Lake Dams Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	49	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	10	NA	NA	NA	NA	NA
Cement	94 lb. bags	2	5	50	10	100	110
Lime	94 lb. bags	1	5	50	5	50	55
Totals					15	150	165

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	5	500	2,500

Total Estimate

2,665

High Emigrant Lake Dam

Repair

The existing slide-gate valve stem is bent and its support frame is absent. The outlet well has been destroyed and it no longer serves to protect the outlet works. The steel outlet conduit is corroded.

To restore the functionality of the outlet works to its original condition would require:

- Repairing the masonry outlet well
- Replacing the slide-gate valve
- Lining the outlet conduit

The outlet well would attach to the dam on one side and be approximately six-feet square in dimension. Approximately 200 rocks would be needed to repair the outlet well walls. The mortar required for this repair is estimated at 15% of the repair volume as follows:

Well (3 side)	Total Length (ft)	Avg. Height (ft)	Avg. Width (ft)	Wall Volume (ft ³)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	18	9	1	162	24	18	4	2

The original slide-gate is believed to have been a 12-inch diameter valve with an eight-foot frame. The outlet conduit is a steel pipe estimated to be 10-feet long and 12-inches in diameter. Although the outlet conduit still appears to be functioning adequately, the inside would be sleeved with a 10-inch diameter schedule 40 PVC pipe to mitigate its eventual corrosion failure. The space between the new 10-inch PVC pipe and the original 12-inch steel pipe would be sealed with bentonite or other equivalent sealing material to prevent leakage.

Maintenance

A new application of mortar to seal the rock joints in the dam against seepage would be completed. The estimated quantity of mortar needed, assuming an average applied thickness of ½-inch over both faces, is:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	56	6	672	28	21	5	2

Ten to fifteen missing rocks would be replaced as needed on both faces of dam. Mortar would be used to stabilize the emplacement of these rocks. Mortar would be used to stabilize the emplacement of these rocks.

High Emigrant Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	39	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	215	NA	NA	NA	NA	NA
Cement	94 lb. bags	9	5	50	45	450	495
Lime	94 lb. bags	4	5	50	20	200	220
Bentonite	50 lb. bags	2	5	50	10	100	110
Gate Valve, 10" w/ 8' frame	Assy	1	500	100	500	100	600
PVC, 10" dia., Sch 40, 8' long	Pipe	1	50	100	50	100	150
Totals					625	950	1,575

Labor Estimate

	Days	Cost	
		Per Day	Total
Crew, 4-person	10	500	5,000
Diver	1	1,000	1,000
Total			6,000

Total Estimate

7,575

Emigrant Meadow Lake Dam*Repair*

The outlet valve and control wheel would be replaced.

Maintenance

Debris from the valve seat would be removed.

Emigrant Meadow Lake Dam Maintenance/Repair Summary**Materials Estimate**

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Outlet Valve Control Wheel	each	1	100	100	100	100	200
Totals					100	100	200

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 2-person	1	250	250

Total Estimate**450****Middle Emigrant Lake Dam***Repair*

The breached portion of the dam would be rebuilt to its original design configuration with new, mortared rock masonry construction. Some of the rock from the breached section can be found at the site, but some new rock would need to be imported. It is estimated that 200 rocks, 6-18 inches in size, would need to be found on or near the site.

The mortar required for this repair is estimated at 15% of the repair volume as follows:

Dam	Length (ft)	Average Height (ft)	Average Width (ft)	Dam Volume (ft ³)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	30	3	3	270	41	31	7	3

Maintenance

A thorough mortar application to seal and stabilize the upstream face of the dam, including the outlet well, would be completed. The estimated quantity of mortar, assuming a ½-inch average applied thickness, is:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	50	5	250	10	8	2	1

Twenty to thirty missing rocks, on both faces of the dam, would be replaced. Mortar, to stabilize their emplacement, would be necessary.

The outlet slide-gate valve assembly is corroded, but is still operational and seats effectively to shut off flow. It will probably be capable of functioning for another 10 years or so before replacement.

Middle Emigrant Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	39	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	230	NA	NA	NA	NA	NA
Cement	94 lb. bags	9	5	50	45	450	495
Lime	94 lb. bags	4	5	50	20	200	220
Totals					65	650	715

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	10	500	5,000

Total Estimate

5,715

Emigrant Lake Dam

Repair

The outlet slide-gate valve assembly would be replaced so the outlet to control reservoir can function as originally intended. A six-inch diameter steel slide-gate valve with an eight-foot frame would be used.

Additionally, the two severely corroded eight-inch steel outlet conduits would be sleeved with a PVC liner to enable them to function well into the future. Schedule 40, six-inch diameter PVC pipe, eight feet long would be used. To seal the space between the two pipes, bentonite or equivalent sealing material would be used.

Maintenance

Fresh mortar would be applied to loose rock joints, especially in the spillway. The mortar would be prepared with on-site sand. Cement and lime delivered to the site should be

mixed with the sand in a ratio of nine parts sand to two parts cement to one part lime. The estimated quantity of mortar needed, assuming an average applied thickness of ½-inch, is as follows:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	80	6	480	20	15	3	2

A few missing rocks in the dam and in the spillway would be replaced. It is estimated that five to 10 rocks would need to be found on site for this purpose. They would be mortared in place to provide stability.

Emigrant Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	15	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	10	NA	NA	NA	NA	NA
Cement	94 lb. bags	3	5	50	15	150	165
Lime	94 lb. bags	2	5	50	10	100	110
Bentonite	50 lb. bags	4	5	50	20	200	220
Gate Valve, 6" w/ 8' frame	Assy	1	500	100	500	100	600
PVC, 6" dia., Sch 40, 8' long	Pipe	2	50	100	100	200	300
Totals					645	750	1,395

Labor Estimate

	Days	Cost	
		Per Day	Total
Crew, 4-person	10	500	5,000
Diver	1	1,000	1,000
Total			6,000

Total Estimate

7,395

Cow Meadow Lake Dams

Reconstruction

The main dam would be reconstructed, as it was originally, with a new, mortared rock masonry dam at the original site. None of the rock from the destroyed dam can be found at the site, so new rock would need to be imported. It is estimated that 500 rocks 6 to 18 inches in size would be needed. The mortar required for this reconstruction is estimated at 15% of the reconstruction volume as follows:

Dam Unit	Length (ft)	Average Height (ft)	Average Width (ft)	Dam Volume (ft ³)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	80	2	2	320	48	36	8	4

No evidence of an outlet control or conduit has been found in the photographic or written records for this dam; therefore, no outlet works would be installed on the reconstructed dam.

Repair

None needed.

Maintenance

The three smaller dams are in excellent condition. Although they currently do not impound water, the rebuilding of Dam 1 means they would be able to impound water without any immediate maintenance.

Cow Meadow Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	36	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	500	NA	NA	NA	NA	NA
Cement	94 lb. bags	8	5	50	40	400	440
Lime	94 lb. bags	4	5	50	20	200	220
Totals					60	600	660

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	15	500	7,500

Total Estimate

8,160

Leighton Lake Dam

Repair

The complete replacement of the outlet conduit would be undertaken to restore the outlet works to its original function. Since the existing conduit is only six-inches in diameter, sleeving the inside of it with a smaller diameter new liner would be impractical. The capacity of a smaller diameter pipe would be too small to allow effective stream flow releases. Replacing the conduit would require dismantling the embankment around conduit, removing and replacing the conduit, and rebuilding the embankment.

The existing simple on-site fabricated slide-gate would need to be copied and installed on the new conduit.

Maintenance

The rocks in the dam would not be mortared with cement but instead would be mortared with natural, on-site clay soil (sod). The intake grate would be cleaned.

Leighton Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	5	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	100	NA	NA	NA	NA	NA
Slide-gate valve, 6"	Assy	1	50	50	50	50	100
Steel, 6" dia., 15' long	Pipe	1	100	100	100	100	200
			Totals		150	150	300

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	15	500	7,500

Total Estimate

7,800

Long Lake Dams

Repair

None proposed.

Maintenance

The control well structure on the main dam would have a small amount of rock and mortar replaced. The mortar required for this repair is estimated at 15% of the repair volume as follows:

Well (1 side)	Total Length (ft)	Avg. Height (ft)	Avg. Width (ft)	Wall Volume (ft ³)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	5	4	2	40	6	5	1	1

When this repair is undertaken, mortar resealing of the upstream face of all dams would be completed. The estimated quantity of mortar needed, assuming an average applied thickness of ½-inch, is as follows:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	28	5	140	6	5	1.0	0.5
2	22	3	66	3	2	0.5	0.3
3	18	4	72	3	2	0.5	0.3

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
4	34	5	170	7	5	1.2	0.6
5	12	2	24	1	1	0.2	0.1
6	5	2	10	0	0	0.0	0.0
7	6	3	18	1	1	0.2	0.1
8	7	3	21	1	1	0.2	0.1
Totals			521	22	17	3.8	2.0

Long Lake Dams Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	22	NA	NA	NA	NA	NA
Rocks, 6"-18" (on/near site)	each	2525	NA	NA	NA	NA	NA
Cement	94 lb. bags	5	5	50	25	250	275
Lime	94 lb. bags	3	5	50	15	150	165
				Totals	40	400	440

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	20	500	10,000

Total Estimate

10,440

Lower Buck Lake Dam

Repair

The eight-inch outlet conduit is severely rusted. It would be lined inside with a PVC pipe liner, ensuring the long-term future operation of the outlet works. The PVC pipe liner would be a six-inch diameter pipe placed inside the eight-inch diameter steel conduit. A bentonite, mortar, or equivalent sealant placed in the space between the two pipes would ensure against leakage.

The existing valve would be replaced since it is corroded and near the end of its life.

Maintenance

The dam would be remortared on its upstream face to reduce leakage, its downstream toe to stabilize some loose rocks, and the outlet well to prolong its life.

The amount of mortar for these repairs, estimated at ½-inch average placed thickness, is as follows:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	41	10	410	17	13	3	1

Logs on the dam and floating in the reservoir nearby would be removed.

Lower Buck Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	13	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	20	NA	NA	NA	NA	NA
Cement	94 lb. bags	3	5	50	15	150	165
Lime	94 lb. bags	1	5	50	5	50	55
Bentonite	50 lb. bags	2	5	50	10	100	110
Gate Valve, 6" w/ 10' frame	Assy	1	500	100	500	100	600
PVC, 6" dia., Sch 40, 12' long	Pipe	1	50	100	50	100	150
Totals					580	500	1,080

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	12	500	6,000

Total Estimate

7,080

Y-Meadow Dam

Although the location of the outlet gate valve is unknown, for the purposes of this analysis, it is assumed to be at the bottom of the dam requiring the lake be drained for any repair or maintenance work. Since no controls are available to open the valve, an underwater diver would be necessary to clean the intake and open the slide-gate.

Repair

If the outlet gate valve and conduit are in poor condition, they would be replaced and lined respectively. It is unknown what size outlet pipe is installed in this dam. Assuming the pipe is eight inches in diameter, it would be lined with a smaller six-inch diameter PVC pipe. A bentonite or grout sealant would be placed in the space between the two pipes to prevent seepage. A new slide-gate outlet valve equal in size to the installed PVC pipe would be installed.

Maintenance

The rock masonry on the dam crest is still sound and cemented relatively well. An inspection of the upstream face of the dam to locate reported leakage and to assess the condition of the outlet works would be completed. At the time of the inspection, a new application of mortar seal over the entire face would be applied. The amount of mortar for the seal, estimated at ½-inch average placed thickness, is as follows:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	88	15	1,320	55	41	9	5

2.2.2. Alternative 2 – No Action

Under the No Action Alternative, no dams would be repaired, maintained, or operated. They would be allowed to deteriorate naturally over time.

Maintained	Dams Not Maintained		
	Snow	Middle Emigrant	Long
	Bigelow	Emigrant	Lower Buck
	Horse	Cow Meadow	Y-Meadow
	Huckleberry	Red Can	Bear
	High Emigrant	Leighton	Cooper Meadow
	Emigrant Meadow	Yellowhammer	Whitesides Meadow

2.2.3. Alternative 3 – Heritage

Alternative 3 includes the repair, maintenance, and operation of the seven dams that are eligible for inclusion on the National Register of Historic Places. Eleven dams would not be maintained or operated and would be allowed to deteriorate naturally. See Map D-2-2.

Dams Maintained		Dams Not Maintained	
Bigelow	Leighton	Snow	Yellowhammer
Emigrant Meadow	Long	Horse	Y-Meadow
Emigrant Lake	Lower Buck	Huckleberry	Bear
Red Can		High Emigrant	Cooper Meadow
		Middle Emigrant	Whitesides Meadow
		Cow Meadow	

For all dams, repair and maintenance would be completed using minimum tool and pack-it-in/pack-it-out philosophy. Mechanized or motorized equipment would not be used, materials would be packed in using livestock, and hand labor would be used for all work proposed.

Use of helicopter or wheeled-equipment may be considered on a case-by-case basis using minimum tool determinations. All activities would be conducted according to existing Forest Service law, regulation, policy, and direction (e.g., group size limits, campfire restrictions, and in accordance with the National Historic Preservation Act and Secretary of Interior's Standards for historical structures).

For many dams, the lake would need to be lowered in order to complete repair and maintenance work. The lowering of a lake could be done by draining through valves that are in working order at the streamflow maintenance dams, siphoning at dams where the valves are not operational or where valves do not exist, or with cofferdams.

Maintenance of the seven dams would also include, but not be limited to, log removal, mortar replacement, and minor rock replacement. Although maintenance may occur regularly, current maintenance needs are described dam-by-dam in the following section.

The following section provides specific repair and maintenance needs for each of the dams proposed to be operated in this alternative.

It should be noted that six of the lakes actually contain a series of dams, not just a single dam. Horse Meadow has 2 dams, Cow Meadow has 4 dams, Bigelow Lake has 5, Huckleberry Lake has 7, Long Lake has 8, and Snow Lake has 12 dams.

Bigelow Lake Dams

Repair

The old, discarded, rusted, and bent slide-gate valve found near the main dam suggests the existing slide-gate valve assembly is a replacement of an earlier, perhaps original, valve. If so, it is estimated the current outlet works is 25 years old. The present slide-gate valve stem and wheel is corroded to the extent that current operability is questionable. To restore the functionality of the outlet works to its original condition would require:

- Replacing the slide-gate and frame
- Sleeving the inside of the 12-inch diameter, eight-foot steel conduit with ten-inch diameter, eight-foot schedule 40 PVC
- Sealing the space between the two pipes with bentonite or equivalent sealing material

The original design drawings indicate the slide-gate valve is 12-inch diameter with a nine-foot frame. The replacement slide-gate valve should be ten-inch diameter with a nine-foot frame.

Maintenance

The main dam (dam 3) and two additional dams (1 and 5) would have their upstream faces resealed with a sand mortar mix. The mortar would be prepared with on-site sand. Cement and lime delivered to the site would be mixed with the sand in a ratio of nine parts sand to two parts cement to one part lime. The quantity of mortar needed, estimated at an average applied thickness of ½-inch, is:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	130	5	650	27	20	5	2
3	81	8	648	27	20	5	2
5	74	4	296	12	9	2	1
Total			1,594	66	49	12	5

Five to ten missing rocks would be replaced on the downstream face of the main dam. Mortar would be used to stabilize the emplacement of these rocks.

Bigelow Lake Dams Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	49	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	10	NA	NA	NA	NA	NA
Cement	94 lb. bags	12	5	50	60	600	660
Lime	94 lb. bags	5	5	50	25	250	275
Bentonite	50 lb. bags	2	5	50	10	100	110
Gate Valve, 10" w/ 9' frame	Assy	1	500	100	500	100	600
PVC, 10" dia., Sch 40, 8' long	Pipe	1	100	100	100	100	200
Totals					695	1,150	1,845

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	10	500	5,000

Total Estimate

6,845

Emigrant Meadow Lake Dam

Repair

The outlet valve and control wheel would be replaced.

Maintenance

Debris from the valve seat would be removed.

Emigrant Meadow Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Outlet Valve Control Wheel	each	1	100	100	100	100	200
Totals					100	100	200

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 2-person	1	250	250

Total Estimate

450

Emigrant Lake Dam*Repair*

The outlet slide-gate valve assembly would be replaced so the outlet to control reservoir releases as originally intended. A six-inch diameter steel slide-gate valve with an eight-foot frame would be used.

Additionally, the two severely corroded eight-inch steel outlet conduits would be sleeved with a PVC liner to enable them to function well into the future. Schedule 40, six-inch diameter PVC pipe, eight feet long would be used. To seal the space between the two pipes, bentonite or equivalent sealing material would be used.

Maintenance

Fresh mortar would be applied to loose rock joints, especially in the spillway. The mortar would be prepared with on-site sand. Cement and lime delivered to the site should be mixed with the sand in a ratio of nine parts sand to two parts cement to one part lime. The estimated quantity of mortar needed, assuming an average applied thickness of ½-inch, is as follows:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	80	6	480	20	15	3	2

A few missing rocks in the dam and in the spillway would be replaced. It is estimated that five to ten rocks would need to be found on site for this purpose. They would be mortared in place to provide stability.

Emigrant Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	15	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	10	NA	NA	NA	NA	NA
Cement	94 lb. bags	3	5	50	15	150	165
Lime	94 lb. bags	2	5	50	10	100	110
Bentonite	50 lb. bags	4	5	50	20	200	220
Gate Valve, 6" w/ 8' frame	Assy	1	500	100	500	100	600
PVC, 6" dia., Sch 40, 8' long	Pipe	2	50	100	100	200	300
Totals					645	750	1,395

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	10	500	5,000
Diver	1	1,000	1,000
Total			6,000

Total Estimate

7,395

Red Can Lake Dam*Repair*

None proposed at this time. Red Can Lake dam is in good condition. Under this alternative future repair needs would be permitted.

Maintenance

None proposed at this time. Red Can Lake dam is in good condition. Under this alternative future maintenance needs would be permitted.

Leighton Lake Dam*Repair*

The complete replacement of the outlet conduit would be undertaken to restore the outlet works to its original function. Since the existing conduit is only six-inches in diameter, sleeving the inside of it with a smaller diameter new liner would be impractical. The capacity of a smaller diameter pipe would be too small to allow effective stream flow releases. Replacing the conduit would require dismantling the embankment around conduit, removing and replacing the conduit, and rebuilding the embankment.

The existing simple on-site fabricated slide-gate would need to be copied and installed on the new conduit.

Maintenance

The rocks in the dam would not be mortared with cement but instead would be mortared with natural, on-site clay soil (sod). The intake grate would be cleaned.

Leighton Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	5	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	100	NA	NA	NA	NA	NA
Slide-gate valve, 6"	Assy	1	50	50	50	50	100
Steel, 6" dia., 15' long	Pipe	1	100	100	100	100	200
Totals					150	150	300

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	15	500	7,500

Total Estimate

7,800

Long Lake Dams

Repair

None proposed.

Maintenance

The control well structure on the main dam would have a small amount of rock and mortar replaced. The mortar required for this repair is estimated at 15% of the repair volume as follows:

Well (1 side)	Total Length (ft)	Avg. Height (ft)	Avg. Width (ft)	Wall Volume (ft ³)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	5	4	2	40	6	5	1	1

When this repair is undertaken, mortar resealing of the upstream face of all dams would be completed. The estimated quantity of mortar needed, assuming an average applied thickness of ½-inch, is as follows:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	28	5	140	6	5	1.0	0.5
2	22	3	66	3	2	0.5	0.3

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
3	18	4	72	3	2	0.5	0.3
4	34	5	170	7	5	1.2	0.6
5	12	2	24	1	1	0.2	0.1
6	5	2	10	0	0	0.0	0.0
7	6	3	18	1	1	0.2	0.1
8	7	3	21	1	1	0.2	0.1
Totals			521	22	17	3.8	2.0

Long Lake Dams Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	22	NA	NA	NA	NA	NA
Rocks, 6"-18" (on/near site)	each	2525	NA	NA	NA	NA	NA
Cement	94 lb. bags	5	5	50	25	250	275
Lime	94 lb. bags	3	5	50	15	150	165
Totals					40	400	440

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	20	500	10,000

Total Estimate

10,440

Lower Buck Lake Dams

Repair

The eight-inch outlet conduit is severely rusted. It would be lined inside with a PVC pipe liner, ensuring the long-term future operation of the outlet works. The PVC pipe liner would be a six-inch diameter pipe placed inside the eight-inch diameter steel conduit. A bentonite, mortar, or equivalent sealant placed in the space between the two pipes would ensure against leakage.

The existing valve would be replaced since it is corroded and near the end of its life.

Maintenance

The dam would be remortared on its upstream face to reduce leakage, its downstream toe to stabilize some loose rocks, and the outlet well to prolong its life.

The amount of mortar for these repairs, estimated at ½-inch average placed thickness, is as follows:

Dam Unit	Length (ft)	Average Height (ft)	Face Area (ft ²)	Mortar (ft ³)	Sand (ft ³)	Cement (94 lb bags)	Lime (94 lb bags)
1	41	10	410	17	13	3	1

Logs on the dam and floating in the reservoir nearby would be removed.

Lower Buck Lake Dam Maintenance/Repair Summary

Materials Estimate

Material	Unit	Qty	Unit Price		Cost		Total
			Purchase	Delivery	Purchase	Delivery	
Sand (on or near site)	ft ³	13	NA	NA	NA	NA	NA
Rocks, 6"-18" (on or near site)	each	20	NA	NA	NA	NA	NA
Cement	94 lb. bags	3	5	50	15	150	165
Lime	94 lb. bags	1	5	50	5	50	55
Bentonite	50 lb. bags	2	5	50	10	100	110
Gate Valve, 6" w/ 10' frame	Assy	1	500	100	500	100	600
PVC, 6" dia., Sch 40, 12' long	Pipe	1	50	100	50	100	150
Totals					580	500	1,080

Labor Estimate

	Cost		
	Days	Per Day	Total
Crew, 4-person	12	500	6,000

Total Estimate

7,080

2.3. MITIGATION COMMON TO ALL ACTION ALTERNATIVES

The Forest Service has also developed the following mitigation measures to be for both action alternatives:

1. Native materials would be used to reconstruct, repair, and maintain the dams when available and feasible.
2. Large boulders and rock faces may not be used as a source for smaller rocks. (i.e., large rocks may not be blasted, sledge hammered, or by any other means broken into smaller rocks).
3. Stock may be used to deliver materials to the project site, but may not be held within the 300-foot perimeter project area around each dam.
4. No rock sleds would be used off existing trails.
5. Campsites and temporary access routes to the project would be designated by the Forest Service and decommissioned immediately following completion of the work.
6. Only certified weed free hay and feed would be used.
7. There would be no campfires consistent with Emigrant Wilderness Standards and Guidelines for firewood availability and existing Forest Orders.
8. All tools and equipment would be cleaned prior to use to prevent non-native plant species from being brought into the wilderness.
9. Sod for Red Can and Leighton Lake dams would be collected in strips on the contour to increase the ability of adjacent plants to recolonize readily. The strips would alternate with intact vegetation to collect sediment moving downslope and to avoid channeling water downhill.
10. If any sensitive plants are found in the project areas, they would be protected.
11. No rock collection on the southeast side of Snow Lake would be allowed.
12. Non-historical dams – Use mortar color that matches the surroundings. (Mortar color on eligible dams would be negotiated in consultation with SHPO prior to final decision.)
13. If collecting rock/materials outside of 300' boundary, would need to complete a Heritage Resources survey.
14. Non-reflective materials would color-match the surrounding area when they would be visible.
15. Provide notification to the public when work is expected to occur at each dam.
16. Keep temporary maintenance trails out of meadow areas in known Yosemite Toad (YT) habitats at all Emigrant lakes and Snow Lake.
17. If collecting rock/materials outside of the 300-foot project area boundary, complete a heritage resources survey.
18. Limit and mitigate erosion and sedimentation associated with dam repair and maintenance from entering lakes or streams (See Best Management Practices, Section 3.1.3.5. for additional detail).
19. Protect water quality by controlling repair and maintenance activities within the RCA (See Best Management Practices, Section 3.1.3.5. for additional detail).
20. Minimize lake and stream channel disturbances and related sediment production (See Best Management Practices, Section 3.1.3.5. for additional detail).

2.4. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of the action, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

2.4.1. Maximize Amphibian Habitat Benefits

An alternative was considered that did not maintain any of the dams and called for the physical removal of the dams. This alternative was dropped from further analysis because it is not consistent with Forest Plan direction, which says, "Dams without a high enough value to warrant retention should be allowed to deteriorate naturally (no maintenance) consistent with FSM direction, rather than removed (Forest Plan Direction, 2002, p. 65)." This alternative does not meet the need to implement the Forest Plan or move forward on the Joint Strategy. In addition, this alternative does not address social and cultural values associated with recreational fisheries and historical resources.

2.4.2. Restore Entire Dam System to Original Functional Levels

An alternative was considered that repaired, maintained, and operated all 18 dams in order to restore the entire dam system. This alternative was dropped from further analysis because it is not consistent with Forest Plan direction, which states, "Management emphasis within the Emigrant Wilderness is to move the Wilderness as a whole toward a more pristine condition by maintaining some areas and moving others to a more pristine Opportunity Class designation (Emigrant Wilderness Management Direction, 2002, p. 5)." This alternative does not meet the need to implement the Forest Plan or move forward on the Joint Strategy.

2.4.3. CDFG/FS Joint Strategy

This alternative considered maintaining the eight dams identified in the Joint Strategy (Appendix A). Alternative 1 already analyzes the same eight dams and provides site-specific analysis needed for the other four dams considered in the Joint Strategy. New survey and monitoring data has been gathered by both the Forest Service and CDFG. In addition, new information, including changes in CDFG stocking program direction, has occurred.

2.4.4. Proposed Action plus Horse Meadow Dam

This alternative does not meet the need to move forward on the Joint Strategy for the following reasons. Previous site analysis indicated that meadow maintenance dams do not function as originally intended – to sub-irrigate the existing meadows for grazing purposes. All meadow maintenance dams were eliminated from consideration in the Joint Strategy

since no lake impoundments, recreation benefits, or fishery enhancements are associated with these structures.

2.4.5. Proposed Action plus Horse Meadow and Yellowhammer Dams

This alternative does not meet the need to move forward on the Joint Strategy for the following reasons. Horse Meadow dam was eliminated for reasons stated in 2.7.4. Yellowhammer Lake is at its natural level and contains a naturally reproducing fishery. It was eliminated from consideration in the Joint Strategy since no additional fishery enhancement is needed.

2.4.6. Proposed Action minus Y-Meadow Dam

This alternative was dropped from further analysis because both Alternatives 2 and 3 call for Y-Meadow dam to deteriorate naturally.

2.4.7. Proposed Action minus Y-Meadow and Leighton Dams

This alternative was dropped from further analysis because (1) Y-Meadow dam was eliminated for reasons stated in 2.7.6 and (2) no maintenance of Leighton dam is addressed in Alternative 2.

2.4.8. Proposed Action minus High Emigrant, Y-Meadow, Snow, and Cow Meadow

This alternative was dropped from further analysis because all of these dams would be allowed to deteriorate naturally in Alternatives 2 and 3.

2.5. COMPARISON OF ALTERNATIVES

Table 2-1 Comparison of Alternatives

Dams ¹	Alternative 1 Proposed Action		Alternative 2 No Action		Alternative 3 Heritage	
	Maintain	Not Maintained	Maintain	Not Maintained	Maintain	Not Maintained
Cherry Creek Watershed – East Fork Cherry Creek						
Snow	✓			✓		✓
Bigelow*	✓			✓	✓	
Horse Meadow		✓		✓		✓
Huckleberry	✓			✓		✓
Cherry Creek Watershed – North Fork Cherry Creek						
High Emigrant	✓			✓		✓
Emigrant Meadow*	✓			✓	✓	
Middle Emigrant	✓			✓		✓
Emigrant Lake*	✓			✓	✓	
Cow Meadow	✓			✓		✓
Cherry Creek Watershed – Middle Fork Cherry Creek						
Red Can*		✓		✓	✓	
Leighton*	✓			✓	✓	
Yellowhammer		✓		✓		✓
Cherry Creek Watershed – West Fork Cherry Creek						
Long*	✓			✓	✓	
Lower Buck*	✓			✓	✓	
Clavey River Watershed – Lily Creek						
Y-Meadow	✓			✓		✓
Bear		✓		✓		✓
South Fork Stanislaus River Watershed – South Fork Stanislaus River						
Cooper Meadow		✓		✓		✓
Whitesides Meadow		✓		✓		✓

¹ Dams marked with an asterisk are eligible for the National Register of Historic Places.

2.6. COMPARISON OF EFFECTS

Table 2-2 Comparison of Effects by Alternative

	Condition Indicators	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3 Heritage
Watershed	Cherry Creek Watershed			
	Impairment of downstream water quality and aquatic habitat	None-Low	None-Low	None-Low
	Restoration of hydrologic function, sediment transport, and hydrologic connectivity	Low	High	Moderate
	Potential riparian and meadow restoration (acres)	-14	+147	+48
	Clavey River Watershed			
	Impairment of downstream water quality and aquatic habitat	None-Low	None-Low	None-Low
	Restoration of hydrologic function, sediment transport, and hydrologic connectivity	Moderate	Moderate	Moderate
	Potential riparian and meadow restoration (acres)	+6	+6	+6
	South Fork Stanislaus Watershed			
	Impairment of downstream water quality and aquatic habitat	None-Low	None-Low	None-Low
	Restoration of hydrologic function, sediment transport, and hydrologic connectivity	High	High	High
	Potential riparian and meadow restoration (acres)	+3	+3	+3
Wilderness	Snow Lake			
	Crowding	Opportunity for solitude decreases (short-term)	No Effects	No Effects
	Campsite and Stock Holding	No effects		
	Firewood Availability	No effects		
	Trails	Social trails may develop (short-term)		
	Bigelow			
	Crowding	Opportunity for solitude decreases (short-term)	No Effects	Opportunity for solitude decreases (short-term)
	Campsite and Stock Holding	Potential vegetation loss & site degradation (short-term)		Potential vegetation loss & site degradation (short-term)
	Firewood Availability	No effects		No effects

	Condition Indicators	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3 Heritage
	Trails	<ul style="list-style-type: none">▪ Social trails may develop (short-term)▪ May effect secondary trail conditions (short-term)		<ul style="list-style-type: none">▪ Social trails may develop (short-term)▪ May effect secondary trail conditions (short-term)
	Horse Meadow			
	Crowding	No Effects	No Effects	No Effects
	Campsite and Stock Holding			
	Firewood Availability			
	Trails			
	Huckleberry			
	Crowding	Opportunity for solitude decreases (short-term)	No Effects	No Effects
	Campsite and Stock Holding	No effects		
	Firewood Availability	No effects		
	Trails	Social trails may develop (short-term)		
	High Emigrant			
	Crowding	Opportunity for solitude decreases (short-term)	No effects	No Effects
	Campsite and Stock Holding	Potential vegetation loss & site degradation (short-term)		
	Firewood Availability	No effects		
	Trails	Social trails may develop (short-term)		
	Emigrant Meadow			
	Crowding	Opportunity for solitude decreases (short-term)	No effects	Opportunity for solitude decreases (short-term)
	Campsite and Stock Holding	No effects		No effects
	Firewood Availability	No effects		No effects
	Trails	No effects		No effects
	Middle Emigrant			
	Crowding	Opportunity for solitude decreases (short-term)	No effects	No Effects
	Campsite and Stock Holding	Potential vegetation loss & site degradation (short-term)		
	Firewood Availability	No effects		
	Trails	Compaction to an undesignated use route. Rehabilitation may be ineffective		
	Emigrant			
	Crowding	Opportunity for solitude decreases (short-term)	No effects	Opportunity for solitude decreases (short-term)
	Campsite and Stock Holding	No effects		No effects
	Firewood Availability	No effects		No effects
	Trails	Social trails may develop (short-term)		Social trails may develop (short-term)
	Cow Meadow			

	Condition Indicators	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3 Heritage
	Crowding	Opportunity for solitude decreases (short-term)	No effects	No Effects
	Campsite and Stock Holding	Potential vegetation loss & site degradation (short-term)		
	Firewood Availability	No effects		
	Trails	No effects		
Red Can				
	Crowding	No effects	No effects	No Effects
	Campsite and Stock Holding			
	Firewood Availability			
	Trails			
Leighton				
	Crowding	Opportunity for solitude decreases (short-term)	No effects	Opportunity for solitude decreases (short-term)
	Campsite and Stock Holding	No effects		No effects
	Firewood Availability	No effects		No effects
	Trails	<ul style="list-style-type: none">Vegetation loss and compaction to the undesignated use routeExisting trails may exceed trail standards		<ul style="list-style-type: none">Vegetation loss and compaction to the undesignated use routeExisting trails may exceed trail standards
Yellowhammer				
	Crowding	No effects	No effects	No effects
	Campsite and Stock Holding			
	Firewood Availability			
	Trails			
Long				
	Crowding	Opportunity for solitude decreases (short-term)	No effects	Opportunity for solitude decreases (short-term)
	Campsite and Stock Holding	No effects		No effects
	Firewood Availability	No effects		No effects
	Trails	<ul style="list-style-type: none">Vegetation loss and compaction to an existing undesignated use routeExisting trails may exceed trail standards		<ul style="list-style-type: none">Vegetation loss and compaction to an existing undesignated use routeExisting trails may exceed trail standards
Lower Buck				
	Crowding	Opportunity for solitude decreases (short-term)	No effects	Opportunity for solitude decreases (short-term)
	Campsite and Stock Holding	No effects		No effects
	Firewood Availability	No effects		No effects
	Trails	Access route would result in compaction and vegetation loss (short-term)		Access route would result in compaction and vegetation loss (short-term)
Y-Meadow				
	Crowding	Opportunity for solitude decreases (short-term)	No effects	No effects
	Campsite and Stock Holding	No effects		

	Condition Indicators	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3 Heritage	
	Firewood Availability	No effects			
	Trails	Access route would result in compaction and vegetation loss (short-term)			
	Bear				
	Crowding	No effects	No effects	No effects	
	Campsite and Stock Holding				
	Firewood Availability				
	Trails				
	Cooper Meadow				
	Crowding	No effects	No effects	No effects	
	Campsite and Stock Holding				
	Firewood Availability				
	Trails				
	Whitesides				
	Crowding	No effects	No effects	No effects	
	Campsite and Stock Holding				
	Firewood Availability				
	Trails				
	Visuals	Is the opportunity class objective being met in the project area and at the lake scale?			
		Snow Lake (Project area/Lake scale)	No/No	No/Yes	No/Yes
		Bigelow Lake	No/No	Yes/Yes	No/No
Horse Meadow		Yes/Yes	Yes/Yes	Yes/Yes	
Huckleberry		Yes/Yes	Yes/Yes	Yes/Yes	
High Emigrant		No/No	No/No	No/No	
Emigrant Meadow		No/Yes	No/Yes	No/Yes	
Middle Emigrant		No/Yes	No/Yes	No/Yes	
Emigrant		No/Yes	No/Yes	No/Yes	
Cow Meadow		No/No	No/Yes	No/Yes	
Red Can		Yes/Yes	Yes/Yes	Yes/Yes	
Leighton		No/No	No/No	No/No	
Yellowhammer		Yes/Yes	Yes/Yes	Yes/Yes	
Long		No/No	No/Yes	No/No	
Lower Buck		No/No	No/Yes	No/No	
Y-Meadow		No/Yes	No/Yes	No/Yes	
Bear		No/Yes	No/Yes	No/Yes	
Cooper		No/Yes	No/Yes	No/Yes	
Whitesides		No/Yes	No/Yes	No/Yes	
Heritage		Would there be an Adverse Effect under 36 CFR 800.5?	Yes, to 1 dam: Red Can dam	Yes, to 7 dams: Bigelow, Emigrant Meadow, Emigrant, Red Can, Leighton, Long, and Lower Buck	None
Wildlife	Federally Threatened – Bald Eagle	May affect but is not likely to adversely affect this species	No Effect	May affect but is not likely to adversely affect this species	
	Region 5 Sensitive Species	No impact on Swainson’s hawk, California spotted owl, willow flycatcher, Sierra Nevada red fox, Relictal salamander, limestone salamander, red bat, wolverine, American marten, Pacific fisher, Western pond turtle or hardhead			

	Condition Indicators	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3 Heritage
		May adversely impact individuals, but is not likely to result in a loss of viability, nor cause a trend to federal listing or a loss of species viability rangewide for Great gray owl, goshawk, mountain yellow-legged frog, and Yosemite toad	May have a beneficial impact on Great gray owl, mountain yellow-legged frog, Yosemite toad, pallid bat, and Townsend's big eared bat	May adversely impact individuals, but is not likely to result in a loss of viability, nor cause a trend to federal listing or a loss of species viability rangewide for Great gray owl, goshawk, mountain yellow-legged frog, and Yosemite toad
Fish	Carrying capacity based on habitat (Lake Fish/Stream Fish)			
	Snow Lake	Maintained/Maintained	Decrease/Decrease	Decrease/Decrease
	Bigelow Lake	Maintained/Maintained	Decrease/Decrease	Maintained/Maintained
	Horse Meadow	Decrease/Short-term ↓	Decrease/Short-term ↓	Decrease/Short-term ↓
	Huckleberry	Maintained/Maintained	Decrease/Decrease	Decrease/Decrease
	High Emigrant	Maintained/Maintained	Decrease/Decrease	Decrease/Decrease
	Emigrant Meadow	Maintained/Maintained	Decrease/Decrease	Maintained/Maintained
	Middle Emigrant	Maintained/Maintained	Decrease/Decrease	Decrease/Decrease
	Emigrant	Maintained/Increased	Decrease/Decrease	Maintained/Increased
	Cow Meadow	Increased/Unknown	No Change/No Change	No Change/No Change
	Red Can	Decrease/Increase	Decrease/Increase	Maintained/Maintained
	Leighton	Increased/Maintained	Decrease/Decrease	Increased/Maintained
	Yellowhammer	Small ↓/Small ↑	Small ↓/Small ↑	Small ↓/Small ↑
	Long	Maintained/Maintained	Decrease/Decrease	Maintained/Maintained
	Lower Buck	Maintained/Maintained	Decrease/Decrease	Maintained/Maintained
	Y-Meadow	No Fish/Maintained	No Fish/Decrease	No Fish/Decrease
	Bear	Decrease/Decrease	Decrease/Decrease	Decrease/Decrease
	Cooper	Unknown/Unknown	Unknown/Unknown	Unknown/Unknown
	Whitesides	No Fish/Unknown	No Fish/Unknown	No Fish/Unknown
Botany	Botrichium ascendens	May affect individuals, but not likely to lead to a trend toward listing or loss of viability	NA	May affect individuals, but not likely to lead to a trend toward listing or loss of viability
	Bothrychium crenulatum	May affect individuals, but not likely to lead to a trend toward listing or loss of viability	NA	May affect individuals, but not likely to lead to a trend toward listing or loss of viability
	Bruchia bolanderi	NA	May affect individuals, but not likely to lead to a trend toward listing or loss of viability	May affect individuals, but not likely to lead to a trend toward listing or loss of viability
	Draba asterophora var. asterophora	NA	NA	NA
	Epilobium howellii	May affect individuals, but not likely to lead to a trend toward listing or loss of viability	NA	NA
	Hulsea brevifolia	NA	NA	NA
	Meesia triquetra	NA	NA	NA

	Condition Indicators	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3 Heritage
	Meesia uliginosa	NA	NA	NA
	Orothotrichum spjutii	NA	NA	NA
Social & Economic	Worst-case scenario for changes in visitation	-4.95%	-27.0%	-11.68%
	Worst-case scenario for changes in local economic activity related to Emigrant Wilderness visitation	-\$48,926	-\$266,870	-\$115,446
Cost	Estimated administrative costs to the government from coordination, mitigation, and monitoring of project activities.	\$33,060	\$0	\$19,285

Chapter 3 – Affected Environment/Environmental Consequences

This chapter discusses the physical, biological, social, and economic environments of the projects area and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2.

The following analysis considered past actions and reasonably foreseeable future action in the determination of cumulative effects. Past actions include trail maintenance, trail reconstruction, heavy stock use, stock fences, fire, vandalism, grazing, fish stocking, and pack trips. Reasonably foreseeable future actions include trail maintenance, trail reconstruction, grazing, fire for resource benefits, heavy stock use, fish stocking, and pack trips.

3.1. WATERSHED

The eighteen dams included in this analysis are located in three of the four watersheds contained in the Emigrant Wilderness. They are the South Fork Stanislaus River, the Clavey River, and the Cherry Creek watersheds. The three watersheds are part of two sub-basins (Tuolumne River and Stanislaus River) included in the San Joaquin River Basin that extends westerly from the crest of the Sierra Nevada to the crest of the Coast Range. Map D-3-1 shows the watersheds and the location of the dams within the watersheds and Table 3-1 provides additional information relating to the watersheds.

Table 3-1 Emigrant Wilderness Watersheds

River Basin	Sub-Basin	Watershed (WS)	WS Number	Total WS Acres	WS Acres in Emigrant	Percent WS Acres in Emigrant
San Joaquin	Tuolumne River	Cherry Creek	1804000902	91,583	65,576	72
San Joaquin	Tuolumne River	Clavey River	1804000905	100,370	6,427	6
San Joaquin	Stanislaus River	South Fork Stanislaus	1804001004	68,522	10,725	16

3.1.1. Soils

Parent material, climate, and topography are the primary factors influencing soil formation. Soil parent material within the Emigrant Wilderness consists primarily of granitic and volcanic rocks, but also includes metasedimentary rocks, glacial till and moraines, and alluvium. Particularly vulnerable to erosion when the vegetation is removed, soils in the Emigrant are young with generally little or no horizon development. Bare rock (particularly granite) dominates much of the ground surface and has a significant effect on the hydrologic

function (surface runoff quantity and timing) of the wilderness watersheds. Table 3-2 shows the dominant surface cover types in the Emigrant Wilderness.

Table 3-2 Dominant Surface Cover Types

Cover Type	Percent of Wilderness Area
Barren	56
Forest	28
Meadow	10
Shrub	4
Water	2

Table 3-3 shows the dominant soil types within the Emigrant Wilderness based on the Order 3 Soil Resource Inventory maps for the Stanislaus National Forest. The Order 3 Soils Inventory is available at the Stanislaus National Forest Supervisors Office.

Table 3-3 Soil Types

Map Unit No.	Map Unit Name	Percent Slope
107	Entic Cryumbrepts, deep	1 - 10
116	Gerle family, deep	5 - 35
122	Gerle family, moderately deep to deep – Rock outcrop complex	5 - 35
124	Gerle family, moderately deep – Rock outcrop complex	10 - 35
125	Gerle family, moderately deep – Rock outcrop complex	35 - 60
148	Inville family, moderately deep to deep complex	15 - 35
163	Lithic Cryopsaments –Entic Cryumbrepts – Rock outcrop complex	20 - 60
164	Lithic Cryumbrepts – Inville family, moderately deep – Rock outcrop complex	10 - 50
165	Lithic Cryumbrepts – Rock outcrop complex	10 - 50
174	Lithic Xerumbrepts, shallow – Rock outcrop complex	35 - 70
183	Rock outcrop – granitic, volcanic, metasedimentary	Variable

The Entic Cryumbrepts are deep soils derived from granitic and volcanic parent material and are associated with mountain meadows. These soils are found in flood plains and stream terraces. The remaining soils are derived from either granite or a combination of volcanic, granitic, metasedimentary, glacial, and alluvial materials. The lithic soils are shallow and the Gerle and Inville soils are moderately deep-to-deep. All the soils typically have high rock fragment content.

The deeper soils are more productive with greater water holding capacity and more nutrients that are critical to supporting vegetation. The typically shallow, poorly developed soils on steep slopes are highly susceptible to disturbance. Overall, soil erodibility in the Emigrant is high. Surface disturbance, including soil compaction and vegetation removal, increases the soils susceptibility to erosion. Recovery of vegetation and soil productivity is slow due to limited water availability during the growing season, cold temperatures, the short growing season, and limited soil organic material.

All of the soils within the Emigrant Wilderness, except the Gerle and Lithic Xerumbrept soils, which are mesic, have frigid or cryic temperature regimes. Frigid and cryic regimes have mean annual soil temperature of less than 8°C and a mesic temperature regime has a mean annual soil temperature of between 8°C and 15°C. The short growing season and cold soil temperatures hinder biological activity such as plant growth.

In summary, soils in the Emigrant Wilderness generally have low to moderate available water holding capacity, low mean annual soil temperature, and experience a short growing season. They are subject to high or very high erosion hazards on slopes greater than 30 percent, have low to moderate natural productivity, and in specific locations, have a seasonally high water table and are susceptible to compaction.

3.1.2. Hydrology

The hydrology and climate within the Emigrant Wilderness varies greatly depending on elevation, geology, and terrain. This section describes general conditions and many of the features of this area.

3.1.2.1. PRECIPITATION

Average annual precipitation for the Emigrant Wilderness, which ranges from 50-55 inches, falls primarily as snow from December through April. The Emigrant Wilderness is almost entirely within the precipitation regime referred to as the snow zone (above 6,000 feet), although the southern reaches of the Wilderness are within the upper reaches of the rain on snow zone. Additional precipitation results from spring and summer thunderstorms. When it occurs, summertime precipitation falls mainly as rain, although snow has occurred throughout the year.

3.1.2.2. TEMPERATURE

Winter temperatures generally range from sub-zero (degrees F) to highs in the fifties. Summers are milder with lows commonly in the 20s and 30s at higher elevations. Highs are variable and range from the 50s to the 90s.

3.1.2.3. STREAMFLOW

Natural streamflow in the Emigrant Wilderness is highest during snowmelt runoff in May and June, decreasing rapidly to low minimum flows that occur from about mid-August until fall precipitation begins. Temporary increases in streamflow may occur during and shortly after summer precipitation events. Low flows under natural conditions may drop below one cubic foot per second (cfs) in late summer and early fall in the perennial streams. In extremely dry years, the surface flow of streams becomes interrupted with pools remaining between dry

rifle and run segments. In wet years, perennial streams flow throughout summer and fall. No permanent gauging stations exist within the Emigrant Wilderness so actual streamflow data is lacking.

The occurrence and duration of low flows is highly variable and depends on the timing of the runoff period, the depth of the winter snowpack, the frequency and amount of summer thunderstorms, and the onset of fall rains. Fall precipitation is usually greater than in the summer months and can rapidly renew streamflow enough to prevent streams from completely drying up through increased runoff and baseflow.

3.1.2.4. STREAM CONDITION

Steep rocky cascades of exposed granite and boulders compose most stream channels in the Emigrant Wilderness. These channels inherently migrate little, exhibiting very high stability. Exceptions are primarily the localized valley bottoms where alluvial deposits exist. These alluvial bottoms, although naturally stable, are the most sensitive to human influences. Channels flowing through more vegetated areas with deeper soils show the most natural instability. Channel substrate ranges from bedrock to fine particles and may be confined or unconfined with localized floodplains.

The alluvial channels are the unique and sensitive to disturbance. These channels are typically lower gradient, unconfined with floodplains, and dominated by finer substrate. Alluvial channels, linked to critical riparian areas including meadows and wetlands, are of special importance. The channels are naturally sensitive because the stream banks are composed of erodible materials and are dependant upon vegetation to withstand the erosive forces of water. When the vegetation is reduced and or eliminated, these channels become unstable. The results of the de-stabilization can greatly alter and even eliminate the surrounding meadows and wetlands.

Reference reach alluvial channels in the Sierra Nevada often have natural stream bank stability greater than 90 percent and near pristine alluvial channels average a width to depth ratio of 8 to 20. Surveyed sensitive stream reaches associated with the project area that have been de-stabilized are upper Cooper Meadow (9% natural stream bank stability and a width to depth ratio of 109) and upper Whitesides Meadow (39% natural stream bank stability and a width to depth ratio of 116). These results are based on a survey conducted in August 1995 using the Forest Service Region 5 SCI protocol for sensitive stream reaches.

3.1.2.5. LAKES

Glaciation has carved enough depressions in the landscape to create over 100 lakes in the Emigrant Wilderness resulting in one of the highest ratios of lakes per unit area in the Sierra Nevada. The surface areas and depths for the lakes vary widely. Estimated depths range from 5 to 75 feet. Surface areas range in size from small ponds to Emigrant Lake, the largest (in both surface area and volume) of the wilderness lakes.

3.1.2.6. WATER QUALITY

Geologic and climatic conditions in the Emigrant Wilderness produce high quality, relatively pure water. The surface waters also remain less affected by human uses than many waters near populated areas.

3.1.2.6.1. Baseline Water Quality

Dissolved ions in surface and ground waters ultimately originate from chemical and physical weathering processes acting on surficial geologic parent materials. The predominantly igneous geology of the Emigrant Wilderness is less susceptible to weathering than sedimentary and metamorphic rocks, so the water is naturally pure. The climate directly influences water quality through the amount and timing of precipitation and temperature, and indirectly through vegetation and soil types. Most of the precipitation in the Emigrant falls as snow that reduces the effects of chemical weathering. The low mean annual air temperature also inhibits weathering rates. The fluctuating flows of spring runoff and the occasional summer thunderstorm have the capacity to cause soil erosion and increase the dissolved solid and sediment content in surface water bodies. However, the short growing season results in slow development of soils and organic matter, limiting the amount of these materials that are available for entering surface waters.

3.1.2.6.2. Water Quality Studies

Several surface water quality studies have been conducted over the last several decades in the Emigrant Wilderness. The surveys had various objectives and were accomplished using a variety of equipment. There was also considerable variation in sampling locations. Therefore, comparison of data is difficult. The studies included:

- Emigrant Water Quality Study, 1970-1982 (water temperature, conductivity, dissolved oxygen, pH, hardness, alkalinity, carbon dioxide, and acidity)
- Bacteria sampling (Gibbs, 1970)
- 1992 Sampling (water temperature, nitrates, organic phosphate, coliform and fecal streptococcus)
- Environmental Protection Agency Western Lake Survey (Landers, et al., 1987)
- A study of the relationship between human use and the presence of Giardia cysts in streams in the Sierra Nevada (Suk, et al., 1987)

Results of these studies are on file in the Stanislaus National Forest Supervisors Office or with other government agencies.

In general, the studies indicated that lakes in the Emigrant are naturally oligotrophic (abundant dissolved oxygen with no marked stratification and deficient in plant nutrients). They have low acid neutralizing capacity and, while they do not appear to be receiving harmful amounts of acid deposition, they are extremely susceptible to acidification should acid deposition increase. Lake sampling also indicated low total hardness, low alkalinity (indicating a very low buffering capacity to acidification), low values for carbon dioxide, and low acidity. The studies indicated low concentrations of dissolved solids in lakes with much higher concentrations in streams, a positive correlation between recreational use and bacteria concentrations, and the presence of Giardia cysts in surface waters.

In summary, the water in lakes in the Emigrant Wilderness is naturally oligotrophic with low buffering capacity. The lakes are considered high quality waters. Past sampling indicates that contamination has occurred that is related to human activities, although temporal and spatial variability of the pollutants are not adequately documented. Conclusions from the water quality studies indicate that more extensive sampling is needed to determine the extent to which human activities are influencing the Emigrant surface waters.

3.1.2.6.3. Water Quality Protection

The Federal Clean Water Act (CWA) and anti-degradation policy, the Central Valley Region Water Quality Control Plan (Basin Plan) for the Sacramento and San Joaquin River Basins, and State Resolution 68-16 require protection of surface water from degradation. Section 303 of the CWA requires states to adopt water quality standards that “consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based on their uses.” Since beneficial uses, together with their corresponding water quality objectives, can be defined per federal regulations as water quality standards, the Basin Plans are regulatory references for meeting the state and federal requirements for water quality control.

Drainages within the South Fork Stanislaus watershed are tributary to the South Fork of the Stanislaus River that flows into New Melones Reservoir located on the Stanislaus River. Drainages within the Clavey River watershed are tributary to the Clavey River that is a tributary to the Tuolumne River. Drainages in the Cherry Creek watershed are tributary to Cherry Creek that is a tributary to the Tuolumne River. The (New) Don Pedro Reservoir is located on the Tuolumne River downstream from the confluences of the Clavey River and Cherry Creek with the Tuolumne River.

Streams in the three watersheds, located partially within the Emigrant Wilderness, are not specifically listed in the Basin Plan. However, the beneficial uses of any specific water body generally apply to its tributary streams. Water bodies for which beneficial uses have been identified in the Basin Plan are the Stanislaus River from its source to New Melones Reservoir (currently proposed beneficial uses) and the Tuolumne River from its source to the (New) Don Pedro Reservoir. The existing beneficial uses, listed below, are the same for both water bodies.

- MUN (Municipal and Domestic Supply) – Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply (downstream of the project area).
- AGR (Agricultural Supply) – Irrigation (downstream of the project area) and stock watering.
- Industry - POW – Uses of water for hydropower generation (downstream of the project area).
- REC-1 – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
- REC-2 – Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, or sightseeing.
- WARM (Warm Freshwater habitat) – Uses of water that support warm water ecosystems (downstream of project area) including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- COLD (Cold Freshwater habitat) – Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

- WILD (Wildlife Habitat) – Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

3.1.2.7. WATER DEVELOPMENTS

The Emigrant dam system was started in the early 1920s to provide additional water volume in the Emigrant as a way to increase the area's trout population, as well as to provide downstream benefits to fish habitat, flood protection, and power production outside the Emigrant.

Fish had been planted in the Emigrant by local stockmen since around the turn of the century, usually brought in by buckets on horseback to this naturally fishless area. Fish were able to survive and sustain themselves, but observations by anglers frequenting the area were that there seemed to be more fish in wet years when streamflow was higher. A system of dams throughout most of the Emigrant was devised. It would store more water and release it in late summer to augment natural flows for the trout population in the Emigrant, as well as downstream in Cherry Valley where recreationists were able to drive to fishing sites.

The original intent of the dam system began to change in 1950. The purpose of 15 of the dams (i.e., streamflow and lake level maintenance dams – see below), a natural fish hatchery, was diminished by the advent of aerial stocking. Fish could be readily planted in remote areas and the dams were no longer needed to support a fishery in the Emigrant. Historically, the California Department of Fish and Game (CDFG) have stocked about 77 of the 100 named wilderness lakes by air. In 1957, the City and County of San Francisco completed construction of Cherry Lake, a 268,000 acre-foot reservoir on Cherry Creek that flooded Cherry Valley. The supplemental downstream water intended for that area by the Emigrant dam system was no longer an issue. The wilderness dams' flood control and power benefits, insignificant when they were built due to the small volume stored compared with Cherry Creek runoff, became inconsequential as large multi-purpose reservoirs were built on the Tuolumne River.

At present, the streamflow and lake volume augmentation capability of the dam system remains. It provides additional late summer-early fall streamflow along the dammed streams, increasing habitat for survival of young-of-the-year fish. However, it is unlikely that augmented flows are essential for streams below streamflow maintenance dams to be self-sustaining since natural summer streamflow is adequate in most years. Evidence from historical reports documents natural fish reproduction in the Emigrant in the 30 years before dam construction (Burgdoff, 1930). Rainbow and brook trout continue to survive in the adjacent Yosemite National Park Wilderness, whose geology, precipitation, streamflow, and lake characteristics are very similar to the Emigrant, even though fish stocking has been phased out over the past 25 years.

Eighteen water control structures exist in the Emigrant Wilderness that were constructed for three purposes; 1) meadow maintenance dams for grazing, 2) lake level maintenance for lake fisheries, and 3) streamflow maintenance for stream fisheries. The Stanislaus National Forest completed an inspection report on the 18 water development structures in 2001 and 2002 and a report was completed in 2003 (Wisehart 2003).

3.1.2.7.1. Streamflow Maintenance Dams

Twelve streamflow augmentation dams (Huckleberry, Leighton, Emigrant, Bigelow, Long, Emigrant Meadow, Lower Buck, Bear, Snow, Middle Emigrant, High Emigrant, and Y-Meadow) were constructed to increase downstream flow during dry weather in the late summer and early fall. All of these dams, except Y-Meadow, are constructed on the outlets of natural lakes. These dams raise the natural lake level from 4 to 10 feet. Y-Meadow dam is 25 feet high and inundates a former meadow. Each of these dams has a small gate valve to regulate streamflow. Currently, the dams are not being operated to regulate streamflow, although seepage through the structures does result in a measured release of water during the drier parts of the year.

3.1.2.7.2. Lake Level Dams

Three lake level maintenance dams (Cow Meadow, Red Can, and Yellowhammer) raise the natural lake level 3 to 4 feet, but were not intended to augment streamflow.

3.1.2.7.3. Meadow Maintenance Dams

Three meadow maintenance dams (Cooper, Whitesides, and Horse Meadow), located in the stream channels at the lower end of meadows were constructed to sub-irrigate the meadows for grazing purposes. The dams in Cooper and Horse Meadow have not largely affected the meadows. Currently, the tops of both dams have washed away. The dam in Whitesides serves to flood the lower end of the meadow during snowmelt runoff creating somewhat of a reservoir. The stream banks in Whitesides are eroding resulting in increased sediment loading.

3.1.2.8. BENEFICIAL USES AND WATER RIGHTS

State law defines “beneficial uses” of California’s waters to include, among other uses, “...domestic; municipal; agricultural and industrial supply; power generation; recreation; esthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources and preserves” – California Regional Water Quality Control Board Central Valley Region Water Quality Control Plan (Basin Plan).

Beneficial uses listed in the Basin Plan that apply to the Tuolumne and Stanislaus River Basins are: municipal and domestic supply, agricultural irrigation and stock watering, industrial service supply and hydropower, recreation contact and non-contact, freshwater habitat (warm and cold), and wildlife habitat. Other beneficial uses that apply to the Emigrant Wilderness surface waters include aesthetic enjoyment, and habitat for threatened, endangered, sensitive, and candidate wildlife and plant species.

The California State Legislature, in State Water Code 1227, declared it “to be in the public interest to provide a priority of right to appropriate water for various beneficial water uses which were initiated by the United States, or its agencies, on reserved lands prior to July 3, 1978, and which uses are for secondary purposes, other than those for which the federal reservation was created, provided that the priority of right does not impair any existing water right.” Under the requirements presented in Water Code 1227, the Stanislaus National Forest submitted use claims for existing water developments within the Emigrant Wilderness to the California State Water Resources Control Board (SWRCB). Table 3-4 lists the

developments for which claims were made and the conditions of use recognized by the SWRCB. These claims are on file with the SWRCB Division of Water Rights.

Table 3-4 Permitted Storage Quantity and Use

Dam	Drainage	Permitted Storage	Period of Storage	Period of Release	First Use	Beneficial Use	SWBCB ID
Snow Lake	EF Cherry	450	Nov – Jun	Jun – Oct	1934	Fish Culture	F005073S
Bigelow Lake	EF Cherry	460	Nov – Jun	Jun – Oct	1931	Fish Culture	F005084S
Horse Meadow	EF Cherry	0	NA	NA	NA	NA	NA
Huckleberry Lake	EF Cherry	400	Nov – Jun	Jun – Oct	1932	Fish Culture	F005078S
High Emigrant Lake	NF Cherry	80	Nov – Jun	Jun – Oct	1952	Fish Culture	F005080S
Emigrant Meadow Lake	NF Cherry	360	Nov – Jun	Jun – Oct	1931	Fish Culture	F005081S
Middle Emigrant Lake	NF Cherry	130	Nov – Jun	Jun – Oct	1952	Fish Culture	F005074S
Emigrant Lake	NF Cherry	2000	Nov – Jun	Jun – Oct	1931	Fish Culture	F005082S
Cow Meadow Lake	NF Cherry	150	Nov – Jun	Jun – Oct	1931	Fish Culture	F005083S
Red Can Lake	MF Cherry	0	NA	NA	NA	NA	NA
Leighton Lake	MF Cherry	350	Nov – Jun	Jun – Oct	1925	Fish Culture	F005077S
Yellow-hammer Lake	MF Cherry	0	NA	NA	NA	NA	NA
Long Lake	Buck Meadow WF Cherry	520	Nov – Jun	Jun – Oct	1932	Fish Culture	F005076S
Lower Buck Lake	Buck Meadow WF Cherry	360	Nov – Jun	Jun – Oct	1931	Fish Culture	F005075S
Y-Meadow Lake	Lily Creek	180	Nov – Jun	Jun – Oct	1933	Fish Culture	F005072S
Bear Lake	Lily Creek	250	Nov – Jun	Jun – Oct	1933	Fish Culture	F005085S
Cooper Meadow	SF Stanislaus	0	NA	NA	NA	NA	NA
Whitesides Meadow	S.F Stanislaus	0	NA	NA	NA	NA	NA

3.1.2.9. RIPARIAN CONSERVATION AREAS AND CRITICAL AQUATIC REFUGE

The Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD) of January 2001 established an Aquatic Management Strategy (AMS) for conservation of streams, riparian areas, and aquatic and riparian-dependent wildlife species. The SNFPA has been combined with other elements of the Stanislaus National Forest Plan into Forest Plan Direction.

The AMS in the Forest Plan Direction consists of nine goals and two principal elements for implementation. These elements are (1) a land allocation and (2) objectives with associated standards and guidelines. The land allocation element establishes Riparian Conservation Areas (RCAs) and Critical Aquatic Refuges (CARs) as special management areas. RCAs are land allocations that are managed to maintain or restore the structure and function of aquatic, riparian, and meadow ecosystems. RCAs are delineated and managed consistent with Riparian Conservation Objectives (RCOs) as described in the standards and guidelines in Part II of Appendix A of the SNFPA ROD. CARs are small sub-watersheds in which the primary management goal is to preserve, enhance, restore, or connect habitats distributed across the landscape for sensitive or listed species to contribute to their viability and recovery. CARs are managed as RCAs and standards and guidelines that apply to RCAs apply to CARs.

All 18 of the Emigrant Wilderness dams are located within RCAs. Two dams, Y-Meadow Dam and Bear Lake Dam, are located on Lily Creek in the Clavey River Watershed. This watershed is the single CAR on the Stanislaus National Forest. Lily Creek, upstream to Y-Meadow dam, is a proposed Wild and Scenic River. Map D-3-2 shows the RCAs and CAR within the Emigrant Wilderness in relation to the 18 Emigrant Wilderness dams.

The second element is a set of six RCOs that are specific measures for achieving the goals of the AMS. The RCOs are described in Appendix A, pages A-53 through A-58 of the SNFPA ROD. Each objective has standards and guidelines that determine the type and amount of activities allowed in RCAs and CARs.

The SNFPA ROD recognizes that RCAs and CARs overlap other land allocations and states (pg. A-23) "The standards and guidelines for riparian conservation areas apply in these areas except where the standards and guidelines of the underlying land allocation place greater restrictions on management activities." Table II.A.1 (pg. A-24) of the ROD summarizes the relationship between standards and guidelines for overlapping land allocations. It shows that management standards and guidelines within existing and proposed wilderness areas and Wild and Scenic River corridors pre-empt all other land allocation standard and guidelines (i.e., RCO standards and guidelines for RCAs and CARs) due to priorities conveyed by their legal status. Therefore, the standards and guidelines for wilderness areas and Wild and Scenic Rivers take precedence over RCO standard and guidelines within the Emigrant Wilderness and the proposed RCO Analysis is not required as part of the analysis for projects within the wilderness or Wild and Scenic River corridor.

3.1.2.10. WATER DEVELOPMENT INFLUENCES ON THE HYDROLOGIC REGIME

The Emigrant landscape is dominated by rock and shallow soils with low infiltration rates (water holding capacity) and generally has a high runoff potential. The entire Emigrant Wilderness contributes to the Sierra Nevada snowpack, the primary source of annual runoff for the San Joaquin Basin.

The natural hydrologic regime in the Emigrant Wilderness responds to a large winter snowpack across a rugged glaciated landscape. Glaciers have formed over 500 lakes and left a largely bedrock surface which is highly efficient at shedding water. The snowpack melts rapidly in the spring and runoff quickly replenishes water in the lakes and produces high streamflow in spring and early summer. After the snowmelt runoff, flows decrease to their lowest by early September, but are often supplemented by summer thunderstorm rains and early fall storms. The annual and seasonal flows vary each year. Lakes in the Emigrant annually fill from snowmelt and draw down one to two feet by evaporation and runoff during the summer. Streamflow carries an annual sediment load that serves to provide soil for meadow building and nutrients for aquatic life.

The Emigrant dam system alters the natural hydrologic regime and related ecological processes. It alters the timing and amount of seasonal streamflows, interrupts the sediment transport process, and changes the natural lake storage capacity.

Peak streamflows are modified by the dam system's additional lake storage capacity that holds water that would otherwise run off quickly during the snowmelt period. During the low flow period in late summer and early fall, streamflow augmentation increases the natural flow rate providing a more uniform flow rate rather than the natural flow which fluctuates more in response to summer rain and early fall storms.

At maximum pool elevation, the streamflow and lake level maintenance dams have increased the lake storage capacity by 4,230 acre-feet (from 11,455 acre-feet to 15,685 acre-feet) and have increased the lake surface area by 190 acres (from 565 acres to 755 acres). This results in seasonal flooding of riparian and terrestrial habitat adjacent to the lakes. Of the inundated acres, approximately 55 percent were former meadow habitat types, 15 percent were mesic types, and 30 percent are rock. Inundation of terrain type varies by lake. Some dams have reduced lakeside riparian and wet meadow habitat, while others have not changed the amount of these habitat types. Lakes with dams that result in seasonal inundation of potential lakeside riparian and/or wet meadow habitat are Snow, Huckleberry, High Emigrant, Emigrant Meadow, Middle Emigrant, Emigrant, Long, Y-Meadow, and Bear Lake. Table 3-5 shows impoundment information for each of the dams in the wilderness.

Sediment transport through the stream system is important for meadow and stream bank soil replenishment and as an in-stream nutrient source for aquatic life. The dams act as sediment traps, storing sediments that would otherwise be transported downstream. This also results in an accelerated rate in the loss of lake storage capacity.

Table 3-5 Emigrant Dams – Water Impoundment

Dam ¹	Dam Height (ft)	Total Volume (acre-ft)	Natural Volume (acre-ft)	Impound Volume (acre-ft)	Total Surface Area (acres)	Natural Surface Area (acres)	Impound Surface Area (acres)
Snow Lake	10	900	610	290	40	32	8
Bigelow Lake	9	1450	1130	320	50	40	10
Horse Meadow	3	0	0	0	0	0	0
Huckleberry Lake	4	3000	2520	480	133	108	25
High Emigrant Lake	8	150	80	70	10	6	4
Emigrant Meadow Lake	6	940	750	190	45	32	13
Middle Emigrant Lake	6	200	110	90	18	10	8
Emigrant Lake	9	4030	2560	1470	195	145	50
Cow Meadow Lake	3	1080	940	140	60	42	18
Red Can Lake	3	150	130	20	8	7	1
Leighton Lake	6	325	225	100	25	21	4
Yellowhammer Lake	3	500	460	40	20	18	2
Long Lake	8	1170	790	380	67	54	13
Lower Buck Lake	10	860	590	270	40	32	8
Y-Meadow Lake	25	180	0	180	20	0	20
Bear Lake	10	750	560	190	24	18	6
Cooper Meadow	0	0	0	0	0	0	0
Whitesides Meadow	3	0	0	0	0	0	0
Total		15,685	11,455	4,230	755	565	190

3.1.3. Effects to the Watersheds

ANALYSIS AREA

The cumulative effects analysis area for the water, riparian, and soil resources that would be affected by maintaining or not maintaining any of the 18 dams includes:

- The area within a 300-foot diameter around each dam
- The area upstream from each structure inundated at maximum pool capacity

¹ Dam names printed in bold are lakes that result in seasonal inundation of potential lakeside riparian and/or wet meadow habitat.

- The stream channels and associated riparian areas downstream from each structure.

RESPONSE TO ISSUES

The watershed effects analysis addresses the natural processes issue:

Repairing, maintaining, and operating dams in the Emigrant Wilderness may alter (or have already altered) natural processes including streamflow regimes and natural lake levels, as well as modify vegetation, wildlife habitat, and riparian areas.

Repairing, maintaining, and operating existing dams or allowing existing dams to deteriorate over time in the Emigrant Wilderness affects hydrologic function (water yield and timing), sediment transport, water quality, meadow and riparian habitat, and watershed connectivity of the lake-stream systems in which the dams are located. This analysis describes the probable consequences of each alternative on these processes and components of lake-stream-meadow systems.

WATER QUALITY

Water quality in lakes and streams may be impacted by dam repair, maintenance, and operation. Potential effects include:

- Soil disturbance (displacement, compaction, or change in ground cover) within the project area resulting in a short-term increase in surface erosion and sedimentation to lakes or streams.
- Lake and stream channel disturbances that lead to increased sediment production.
- Placement of materials used in dam repair, and maintenance into lakes or streams that may cause water quality degradation.

Potential impacts to water quality resulting from dam repair and maintenance may be minimized or eliminated by implementing Best Management Practices (BMPs). BMPs are monitored to ensure proper implementation and effectiveness, and additional or different measures may be applied to protect soil and water resources, if needed. BMPs are listed in Section 3.1.3.5.

Dams accumulate and store sediment that normally would be transported through the lake and stream system. In lakes, the sediment accumulates primarily within the natural lake depression, below the elevation of the natural outlet. Therefore, it may be assumed that most, if not all, of the accumulated sediment will remain in place as a lake level or streamflow augmentation dam deteriorates and breaches. Behind meadow maintenance dams, sediment accumulates within the natural channel and on the surface of the meadow inundated by the dam. Breaching the dam may result in erosion of some or all of the accumulated sediments as the channel adjusts to the original (pre-dam) base level. If breaching occurs gradually (as opposed to catastrophically during a major runoff event), the accumulated sediments will have time to stabilize due to re-vegetation, and erosion and transport of the material into the stream system can be expected to occur slowly. If a dam fails catastrophically, large flushes of accumulated sediment may occur resulting in short-term impacts to water quality (increased turbidity) and aquatic habitat (sediment deposition) within the downstream lake-stream-meadow systems.

WATER YIELD/TIMING, SEDIMENT TRANSPORT, WATERSHED CONNECTIVITY

The existing Emigrant Wilderness dam system alters the natural hydrologic regime and related ecological processes. It alters the timing and amount of seasonal stream flows, interrupts the sediment transport process, changes the natural lake storage capacity, and disrupts the hydrologic connectivity of the lake-stream-meadow systems.

The dam system disrupts the natural timing, variability, and duration of floodplain inundation and water table elevation of lakes, streams, and meadows. Peak stream flows are modified by the dams' additional lake storage capacity that holds water that will otherwise run off quickly during the snowmelt period. During the low flow period in summer and early-mid fall, streamflow augmentation increases the natural flow rate, providing a more uniform flow rather than the natural flow that fluctuates more in response to summer and early fall rainfall events.

Dams have increased the storage volume and area impounded to approximately 135 percent of the natural values. The results are seasonal flooding of riparian habitat associated with lakes, streams, and natural meadows that have dams.

Lakeside riparian vegetation is less likely to survive where seasonal fluctuations in lake level occur due to the presence of a dam that is managed as a streamflow regulator (i.e., water is stored during half of the year and then gradually released during the remainder of the year). Lake level fluctuations for the Emigrant Wilderness dams range between 3 and 25 feet. Without dams, the natural lake level changes are much more subdued, allowing riparian vegetation to become established and survive in a more stable environment.

Sediment transport through the lake and stream system is important for meadow and streambank soil replenishment and as an in-stream nutrient source for aquatic life. The dams act as sediment traps, storing sediment that will otherwise be transported downstream. A gradual reduction in the natural water storage capacity of lakes occurs over time as sediment accumulates behind the dams.

Dams interrupt the hydrologic connectivity between lakes, streams, and meadows by creating barriers to upstream or downstream passage for aquatic-dependent species.

3.1.3.1. ALTERNATIVE 1 – PROPOSED ACTION

Map D-3-3 shows dams that would be repaired, maintained, and operated and which would be allowed to deteriorate naturally. Table 3-6 is a summary of the effects of the alternative.

3.1.3.1.1. Direct and Indirect Effects

Cherry Creek Watershed

Water Quality

Ten streamflow augmentation dams and one lake level dam would be repaired, maintained, and operated. BMPs would be implemented, monitored, and modified (if necessary) to prevent potential adverse impacts to the water quality in the lakes and downstream drainages from the activities required to repair the dams.

Non-maintenance of two lake level dams and one meadow maintenance dam is not expected to result in large flushes of stored sediment into the stream system.

The lake level dams are located on natural lakes and additional sediment that has accumulated in the lake as a direct result of the dam has generally been within the natural lake depression. It is expected that this material would either remain in place or only very gradually re-enter the stream system once the dams have breached. Loss of the meadow maintenance dam is not expected to result in large influxes of stored sediment into the stream system. The accumulated sediment should stabilize due to re-vegetation as the dam gradually deteriorates and breaches. There should be little or no effect on downstream water quality or aquatic habitat due to the natural deterioration and breaching of this dam.

Water Yield/Timing, Sediment Transport, Watershed Connectivity

Eleven of the 14 dams within the Cherry Creek watershed would be repaired, maintained, and operated. The retained dams include 10 streamflow augmentation dams with a total storage capacity of 3,720 acre-feet and one lake level dam (Cow Meadow Lake dam) with an existing storage capacity of 0 acre-feet. The main dam at Cow Meadow Lake has been destroyed by past storm events and the existing storage capacity of the lake is its natural capacity. The Proposed Action would reconstruct Cow Meadow Lake dam, restoring the dam's original storage capacity of approximately 140 acre-feet. The three dams that would not be retained include two lake level maintenance dams (Red Can Lake and Yellowhammer Lake) and one meadow maintenance dam (Horse Meadow). The total storage capacity that would be lost from these three dams is about 62 acre-feet. The total existing storage capacity of the dams in the Cherry Creek watershed is 3,722 acre-feet. The Proposed Action would result in a total storage capacity of 3,800 acre-feet, or a net gain of 78 acre-feet.

The three dams that would be allowed to deteriorate are located in two separate drainages and one is located in the headwaters of its drainage¹. Loss of these dams would contribute little toward restoring natural processes within the Cherry Creek watershed. The natural hydrologic function (water yield and timing), sediment transport processes, and hydrologic connectivity within the Cherry Creek watershed would remain disrupted by the remaining dams. The decline in the natural lake storage capacity would occur at an (undetermined) accelerated rate since the dams result in sediment accumulation in the lakes at faster than normal geologic rates.

Riparian/Meadow Habitat

Restoration of natural timing, variability, and duration of seasonal inundation of lakeside and streamside areas, and restoration of natural water table elevation in meadows and riparian areas due to the eventual loss of one meadow maintenance dam (Horse Meadow) and two lake level dams (Red Can and Yellowhammer lakes) would result in the restoration of approximately 4 acres of riparian and meadow habitat. Rebuilding Cow Meadow Lake Dam, a lake level maintenance dam, would result in a loss of about 18 acres of potential lakeside riparian area that currently has been in the process of reestablishing itself since the dam failed in the late 1990s. Therefore, it is expected the Proposed Action would result in a net loss of about 14 acres of potential riparian-meadow habitat.

¹ Red Can and Yellowhammer in Middle Fork Cherry Creek, Horse Meadow in East Fork Cherry Creek.

Clavey River Watershed

Water Quality

One streamflow augmentation dam (Y-Meadow dam) would be repaired, maintained, and operated. BMPs would be implemented, monitored, and modified (if necessary) to prevent potential adverse impacts to the quality of water in the lake and downstream drainage resulting from the repair and maintenance of the dam.

One streamflow augmentation dam (Bear Lake dam) would not be repaired and would be allowed to deteriorate and breach naturally. Bear Lake is a natural lake and additional sediment that has accumulated in the lake as a direct result of the dam has generally been within the natural lake depression. It is expected that this material would either remain in place or only very gradually re-enter the stream system once the dam is breached. Downstream water quality or stream habitat should not be affected by the release of this sediment as the dam deteriorates and breaches.

Water Yield/Timing, Sediment Transport, Watershed Connectivity

One (Y-Meadow Lake dam) of the two dams within the Clavey River watershed would be repaired, retained, and operated and one (Bear Lake dam) would be allowed to naturally deteriorate. Both of the dams are streamflow augmentation dams. The total storage capacity of the dams is 370 acre-feet. The Proposed Action would result in a net loss of 190 acre-feet of storage capacity after Bear Lake Dam breaches.

The Proposed Action results in only a partial restoration of natural processes within Lily Creek and the Clavey River watershed. Hydrologic connectivity within Lily Creek would be only partially restored due to the breaching of Bear Lake Dam. Retention of Y-Meadow Lake Dam would continue to alter the natural flow regime within the watershed by altering the quantity and timing of flow downstream from the dam. The nutrient supply for aquatic life and the amount of material available for soil replenishment in and adjacent to Lily Creek downstream from the dam would continue to be diminished by the dam. Over time, as the volume of sediment accumulating behind Y-Meadow Lake dam increases, the water storage capacity of the dam would decrease. Eventually, the capacity of the dam may be reduced enough so that it would no longer be able to effectively regulate downstream flows for maintaining a downstream fishery.

Riparian/Meadow Habitat

Approximately 6 acres of potential riparian habitat along the perimeter of Bear Lake would be restored to natural conditions as the dam deteriorates and breaches.

South Fork Stanislaus River Watershed

Water Quality

There are two meadow maintenance dams in this watershed: Cooper Meadow dam and Whitesides Meadow dam. Neither of the dams would be retained and they would be allowed to naturally deteriorate and breach over time. Therefore, there would be no impacts to water quality resulting from repair activities.

Loss of the two meadow maintenance dams is not expected to result in large releases of stored sediment into the stream system. Gradual deterioration and breaching of the structures would allow the sediment that has accumulated behind the dams to stabilize due to re-vegetation. Impairment of downstream water quality or aquatic habitat is not expected from the breaching of these dams.

Water Yield/Timing, Sediment Transport, Watershed Connectivity

Neither of the two meadow maintenance dams would be retained or maintained in the Proposed Action. The existing storage capacity of the dams is about 30 acre-feet and would be lost in the Proposed Action.

As the dams deteriorate, natural hydrologic function (water yield and timing), sediment transport processes, and hydrologic connectivity within the watershed would revert to pre-dam conditions.

Riparian/Meadow Habitat

Restoration of natural timing, variability, and duration of seasonal inundation and water table elevation in meadows due to the deterioration of the two meadow maintenance dams would result in an eventual restoration of approximately 3 acres of natural meadow/streamside habitat.

3.1.3.1.2. Cumulative Effects

All Watersheds

All dams are located within a designated wilderness area. Management activities permitted within the Emigrant Wilderness are limited to activities consistent with maintaining the wilderness character of the area and are described in the 2002. Impacts associated with maintaining 12 of the 18 existing wilderness dams and not maintaining 6 of the dams, when added to past, present or reasonably future actions inside the Emigrant Wilderness, are not expected to result in significant cumulative impacts on water quality, water yield or timing, or riparian resources within the analysis area.

3.1.3.1.3. Other Potential Effects

Cherry Creek and Clavey River Watershed

One of the dams that would not be retained (Bear Lake) has a state permitted use to annually store and release up to 250 acre-feet of water for fish culture purposes (i.e., downstream flow augmentation). Abandonment of the dam would result in a forfeiture of the Forest claim to this water (due to non-use) once operation of the dam is discontinued.

Table 3-6 Summary of Effects for Alternative 1

Dam (Purpose) ¹	Existing State Permitted Beneficial Use (Change in Permitted Use Resulting from Alternative) Acre-Feet	Existing Storage Capacity (Change in Dam Storage Capacity Resulting from Alternative) Acre-Feet	Surface Area of Lake or Meadow Inundated without Dam (Total Area Inundated with Dam) Acres	Lakeside or Meadow Habitat Restored to Natural (Pre-dam) Condition Acres
Cherry Creek Watershed – East Fork Cherry Creek				
Snow Lake (SA)	450 (0)	290 (0)	32 (40)	0
Bigelow Lake (SA)	460 (0)	320 (0)	40 (50)	0
*Horse Meadow (MM)	0 (0)	2 (-2)	0 (1 est.)	1 (est.)
Huckleberry Lake (SA)	400 (0)	480 (0)	108 (133)	0
Cherry Creek Watershed – North Fork Cherry Creek				
High Emigrant Lake (SA)	80 (0)	70 (0)	6 (10)	0
Emigrant Meadow Lake (SA)	360 (0)	190 (0)	32 (45)	0
Middle Emigrant Lake (SA)	130 (0)	90 (0)	10 (18)	0
Emigrant Lake (SA)	2000 (0)	1470 (0)	145 (195)	0
Cow Meadow Lake (LL)	150 ² (0)	0 ³ (140)	42 (60)	-18 ⁴
Cherry Creek Watershed – Middle Fork Cherry Creek				
*Red Can Lake (LL)	0 (0)	20 (-20)	7 (8)	1
Leighton Lake (SA)	350 (0)	100 (0)	21 (25)	0
*Yellowhammer Lake (LL)	0 (0)	40 (-40)	18 (20)	2
Cherry Creek Watershed – West Fork Cherry Creek				
Long Lake (SA)	520 (0)	380 (0)	54 (67)	0
Lower Buck Lake (SA)	360 (0)	270 (0)	32 (40)	0
Total: Cherry Creek WS	5260 (0⁵)	3720 (78⁶)		-14⁷
Clavey River Watershed – Lily Creek				
Y-Meadow Lake (SA)	180 (0)	180 (0)	0 (20)	0
*Bear Lake (SA)	250 (-250)	190 (-190)	18 (24)	6
Total: Clavey River WS	430 (-250)	370 (-190)		6
South Fork Stanislaus River Watershed – South Fork Stanislaus River				
*Cooper Meadow (MM)	0 (0)	0 (0)	0 (0)	0
*Whitesides Meadow (MM)	0 (0)	30 (-30)	0 (3 est.)	3 (est.)
Total: South Fork Stanislaus River WS	0	30 (-30)		3

*Dam that would not be retained, maintained, or operated in this alternative.

¹ SA - Streamflow Augmentation Dam; MM - Meadow Maintenance Dam; LL - Lake Level Maintenance Dam

² Modify existing permitted use from storage & release to storage since outlet valve would not be installed when dam is reconstructed.

³ Main dam at Cow Meadow Lake washed out; therefore, existing storage capacity is 0.

⁴ Loss of existing habitat when dam is rebuilt.

⁵ Forfeiture of permitted water use through abandonment (non-maintenance & non-operation) of dam(s).

⁶ Net storage capacity increases due to rebuilding of Cow Meadow Dam.

⁷ Net decrease due to rebuilding of Cow Meadow Dam.

3.1.3.2. ALTERNATIVE 2 – NO ACTION

Map D-3-4 shows dams that would be repaired, maintained, and operated and those that would be allowed to deteriorate naturally. Table 3-7 is a summary of the effects of the alternative.

3.1.3.2.1. Direct and Indirect Effects

Cherry Creek Watershed

Water Quality

None of the 14 dams within the Cherry Creek watershed would be retained in the No Action Alternative and all of them would be allowed to naturally deteriorate and breach.

Gradual deterioration and breaching of 10 streamflow augmentation dams, three lake level maintenance dams, and one meadow maintenance dam is not expected to result in large flushes of stored sediment to the stream system. The streamflow augmentation and lake level dams are located on natural lakes and additional sediment that has accumulated in these lakes as a direct result of the dam has generally been within the natural lake depression. It is expected that this material would either remain in place or only very gradually re-enter the stream system once the dams have breached. Loss of the meadow maintenance dam is not expected to result in the release of large quantities of stored sediment into the stream system. Gradual deterioration and breaching of the dam would allow the accumulated sediment to stabilize due to re-vegetation. Downstream water quality or aquatic habitat is not expected to be impaired due to excessive sedimentation due to breaching of any of these dams.

Water Yield/Timing, Sediment Transport, Watershed Connectivity

The existing storage capacity all of the dams in the Cherry Creek watershed is 3,722 acre-feet. None of 14 dams within the Cherry Creek watershed would be retained, maintained, and operated in the No Action Alternative. The alternative results in an eventual loss of 3,722 acre-feet of reservoir storage capacity as the dams deteriorate and breach.

As the dams deteriorate and breach, the natural hydrologic function (water yield and timing), sediment transport processes, and hydrologic connectivity within the Cherry Creek watershed is expected to eventually return to pre-dam conditions.

Riparian/Meadow Habitat

Restoration of natural timing, variability, and duration of floodplain inundation and water table elevation in meadows and riparian areas would result in an eventual restoration of up to 147 acres of potential meadow and riparian habitat that currently is inundated by the dams.

Clavey River Watershed

Water Quality

The two dams within the Clavey River watershed would not be retained in the No Action Alternative and both of them would be allowed to deteriorate naturally. There would be no direct impacts to water quality resulting from repair of dams.

Gradual deterioration of Bear Lake dam is not expected to result in large flushes of stored sediment to the stream system. Bear Lake is a natural lake and additional sediment that has accumulated in the lake as a direct result of the dam has generally been within the natural lake depression. It is expected that this material would either remain in place or very gradually be released to the stream system once the dam has breached. Impacts on downstream water quality and aquatic habitat due to increased sedimentation would not be expected due to the natural deterioration and breaching of this dam.

Y-Meadow dam impounds water in a former meadow and sediment accumulates on the former meadow surface. The volume of sediment that has accumulated behind the dam since it was constructed added to the volume that may accumulate before the dam breaches may be substantial. As the dam deteriorates, the drainage readjusts to lowered base levels and stored sediment may be flushed downstream during high flow events. Therefore, it is possible that there could be some impairment to downstream water quality and/or aquatic habitat due to increased turbidity and channel sedimentation. However, due to the construction method used for Y-Meadow dam (i.e., large boulders placed against the entire downstream face of the dam) the dam may never fully breach. The boulders placed against the dam, as well as the rocks used to construct the dam, would remain in the drainage for an indefinitely long period even if the dam itself completely falls apart, creating a large check dam across the drainage of considerable height that undoubtedly would prevent most of the accumulated sediment from moving downstream. In this situation, there may be very little impact to the downstream aquatic habitat and water quality resulting from the erosion and downstream transport of stored sediments.

Water Yield/Timing, Sediment Transport, Watershed Connectivity

The existing storage capacity all of the dams in the Clavey River watershed is 370 acre-feet. Neither of two dams in the watershed would be retained, maintained, and operated. The No Action Alternative would result in an eventual loss of up to 370 acre-feet of reservoir storage capacity as the dams deteriorate.

As the dams deteriorate, the natural hydrologic function (water yield and timing of yield) and sediment transport processes within the Clavey River watershed would gradually revert to near pre-dam conditions. Hydrologic connectivity may never fully be fully restored without human intervention at Y-Meadow dam due to the remnants of the dam (i.e., boulders) remaining in the drainage for an indefinite period after the dam has deteriorated, effectively blocking the upstream and downstream movement of aquatic species.

Riparian/Meadow Habitat

Restoration of natural timing, variability, and duration of floodplain inundation and water table elevation in meadows and riparian areas would result in an eventual restoration of up to 6 acres of meadow and riparian habitat that is currently impacted by the seasonal inundation due to the Bear Lake dam.

There would undoubtedly be significant accumulations of sediment behind Y-Meadow dam before complete deterioration of the dam. Large boulders remaining in the drainage as the dam deteriorates are expected to act as a very large check dam that would prevent most of the accumulated sediment from moving downstream. Since the sediment is deposited on the surface of the former meadow, the natural meadow appearance and function would not be expected to return to their pre-dam condition, even after the dam completely deteriorates.

South Fork Stanislaus River Watershed

Water Quality

There are two meadow maintenance dams in the watershed. Neither of the dams would be retained in the No Action Alternative and both of them would be allowed to deteriorate over time. There would be no impacts to water quality resulting from dam repair activities.

Loss of the two meadow maintenance dams is not expected to result in large flushes of stored sediment into the stream system. Gradual deterioration and breaching would allow the sediment that has accumulated behind the dams to stabilize due to revegetation. Impairment of downstream water quality or aquatic habitat would not be expected from the loss of these dams.

Water Yield/Timing, Sediment Transport, Watershed Connectivity

The existing storage capacity all of the dams in the watershed is about 30 acre-feet. Since neither dam would be retained, eventual breaching would result in the loss of the 30 acre-feet of reservoir storage capacity.

As the dams deteriorate, the natural hydrologic function (water yield and timing of yield), sediment transport processes, and hydrologic connectivity within the watershed would return to pre-dam conditions.

Riparian/Meadow Habitat

Restoration of natural timing, variability, and duration of floodplain inundation and water table elevation in meadows due to the deterioration of the two meadow maintenance dams would result in an eventual restoration of approximately 3 acres of meadow habitat.

3.1.3.2.2. Cumulative Effects

All Watersheds

All dams are located within a designated wilderness area. Management activities permitted within the Emigrant Wilderness are limited to activities consistent with maintaining the wilderness character of the area and are described in the 2002 Emigrant Wilderness Management. Impacts associated with not maintaining 18 existing wilderness dams, when added to past, present or reasonably future actions inside the Emigrant Wilderness, would not result in significant cumulative impacts to water quality, water yield or timing, or riparian resources.

3.1.3.2.3. Other Potential Effects

Clavey River Watershed

Boulders used in the construction of Y-Meadow dam are too large to be removed by high flows and would form a large loose rock check dam in the drainage. The check dam would retain all or most of the sediments stored behind Y-Meadow dam and possibly result in additional sediment accumulation. Even though Y-Meadow dam would be allowed to deteriorate naturally, it is not expected that the meadow would regain its natural appearance and function over time. As a result, there would be an irreversible loss of up to 20 acres of natural meadow habitat.

Table 3-7 Summary of Effects for Alternative 2

Dam (Purpose) ¹	Existing State Permitted Beneficial Use (Change in Permitted Use Resulting from Alternative) Acre-Feet	Existing Dam Storage Capacity (Change in Dam Storage Capacity Resulting from Alternative) Acre-Feet	Surface Area of Lake or Meadow Inundated without Dam (Total Area Inundated with Dam) Acres	Lakeside or Meadow Habitat Restored to Natural (Pre-dam) Condition Acres
Cherry Creek Watershed – East Fork Cherry Creek				
*Snow Lake (SA)	450 (-450)	290 (-290)	32 (40)	8
*Bigelow Lake (SA)	460 (-460)	320 (-320)	40 (50)	10
*Horse Meadow (MM)	0 (0)	2 (-2)	0 (1 est.)	1 (est.)
*Huckleberry Lake (SA)	400 (-400)	480 (-480)	108 (133)	25
Cherry Creek Watershed – North Fork Cherry Creek				
*High Emigrant Lake (SA)	80 (-80)	70 (-70)	6 (10)	4
*Emigrant Meadow Lake (SA)	360 (-360)	190 (-190)	32 (45)	13
*Middle Emigrant Lake (SA)	130 (-130)	90 (-90)	10 (18)	8
*Emigrant Lake (SA)	2000 (-2000)	1470 (-1470)	145 (195)	50
*Cow Meadow Lake (LL)	150 (-150)	0 ² (0)	42 (60)	0
Cherry Creek Watershed – Middle Fork Cherry Creek				
*Red Can Lake (LL)	0 (0)	20 (-20)	7 (8)	1
*Leighton Lake (SA)	350 (-350)	100 (-100)	21 (25)	4
*Yellowhammer Lake (LL)	0 (0)	40 (-40)	18 (20)	2
Cherry Creek Watershed – West Fork Cherry Creek				
*Long Lake (SA)	520 (-520)	380 (-380)	54 (67)	13
*Lower Buck Lake (SA)	360 (-360)	270 (-270)	32 (40)	8
Total: Cherry Creek WS	5260 (-5260)³	3722 (-3722)⁴		147⁵
Clavey River Watershed – Lily Creek				
*Y-Meadow Lake (SA)	180 (-180)	180 (-180)	0 (20)	0 ⁶
*Bear Lake (SA)	250 (-250)	190 (-190)	18 (24)	6
Total: Clavey River WS	430 (-430)	370 (-370)		6
South Fork Stanislaus River Watershed – South Fork Stanislaus River				
*Cooper Meadow (MM)	0 (0)	0 (0)	0 (0)	0
*Whitesides Meadow (MM)	0 (0)	30 (-30)	0 (3 est.)	3 (est.)
Total: South Fork Stanislaus River WS	0	30 (-30)		3

¹Dam that would not be retained, maintained, or operated.

All Watersheds

None of the 18 dams would be maintained and all structures would be allowed to deteriorate naturally over time. Dams would not be operated to maintain the existing permitted

¹ SA – Streamflow Augmentation Dam; MM – Meadow Maintenance Dam; LL – Lake Level Maintenance Dam

² Main dam at Cow Meadow Lake washed out; therefore, existing storage capacity is 0.

³ Forfeiture of all permitted water use through abandonment (non-maintenance and non-operation) of dams.

⁴ Loss of all storage capacity through abandonment (non-maintenance) of dams.

⁵ Restoration of lakeside habitat does not occur for dams that would be retained. The value shown represents the difference between total surface area inundated at maximum pool elevation for the dams that would not be retained and the natural surface area of the lakes/meadows (i.e., area inundated without the dam).

⁶ Assume original meadow habitat is irretrievably lost due to sedimentation.

beneficial uses. The Forest's right to annually store and release 5,260 acre-feet of water from the dams for the purpose of fish culture would be forfeited due to non-use.

3.1.3.3. ALTERNATIVE 3 – HERITAGE

Map D-3-5 shows the dams that would be repaired, maintained, and operated and those that would be allowed to deteriorate naturally. Table 3-8 is a summary of the effects of the alternative.

3.1.3.3.1. Direct and Indirect Effects

Cherry Creek Watershed

Water Quality

Six streamflow augmentation dams and one lake level dam would be repaired, maintained, and operated. BMPs would be implemented, monitored, and modified (if necessary) to prevent potential adverse impacts to the quality of water in lakes and downstream drainages resulting from the repair and maintenance of the dams.

Non-maintenance of four streamflow augmentation dams, two lake level dams, and one meadow maintenance dam is not expected to result in large flushes of stored sediment into the stream system. The streamflow augmentation and lake level dams are located on natural lakes and additional sediment that has accumulated in these lakes as a direct result of the dams has generally been within the natural lake depression. It is expected that this material would either remain in place or very gradually re-enter the stream system once the dams have breached. Loss of the meadow maintenance dam is not expected to result in large flushes of stored sediment into the stream system. Gradual deterioration and breaching of the dam would allow the accumulated sediment to stabilize due to re-vegetation. Impairment of downstream water quality or aquatic habitat due to sedimentation is not expected to result from breaching any of these dams.

Water Yield/Timing, Sediment Transport, Watershed Connectivity

Seven of the 14 dams within the Cherry Creek watershed would be repaired, maintained, and operated. These dams include six streamflow augmentation dams and one lake level dam with a total storage capacity of 2,728 acre-feet and one lake level dam with an existing storage capacity of 20 acre-feet. The seven dams that would not be retained include four streamflow augmentation dams, two lake level dams, and one meadow maintenance dam. These dams have a total storage capacity of 972 acre-feet that would be lost in this alternative.

The seven dams that would be allowed to deteriorate and breach include three of four dams in the East Fork Cherry Creek drainage, three of five dams in the North Fork Cherry Creek drainage and one of three dams in the Middle Fork Cherry Creek drainage. Overall, the breaching of these dams would have a moderate effect on restoring natural processes within the Cherry Creek watershed.

The natural hydrologic function (water yield and timing of yield), sediment transport processes, and hydrologic connectivity within the East Fork Cherry Creek sub-watershed and Middle Fork Cherry Creek would benefit the most in this alternative. The only dam that would be retained in East Fork Cherry Creek sub-watershed is in the headwaters of a

tributary to East Fork Cherry Creek (Bigelow). Since the effect of this dam on the natural processes in the sub-watershed is minor, removing the remaining dams in within the drainage would have a beneficial effect of restoring natural processes. The dams that would be retained in Middle Fork Cherry Creek watershed are in the headwater area of the sub-watershed so their overall effect on hydrologic function, sediment movement, and watershed connectivity are relatively small (Red Can and Leighton). Allowing one dam to deteriorate farther downstream would have an overall beneficial effect on restoring natural processes within the drainage (Yellowhammer).

In the North Fork Cherry Creek sub-watershed, the three dams that would not be retained alternate along the drainage (i.e., are in between) with the two dams that would be retained. Overall, the restoration of natural processes, especially watershed connectivity, but also sediment transport and water yield and timing, would not be greatly improved in the drainage.

Riparian/Meadow Habitat

Restoration of natural timing, variability, and duration of floodplain inundation and water table elevation in meadows and riparian areas would result in an eventual restoration of up to 48 acres of potential meadow and riparian habitat that is currently inundated by the dams.

Clavey River Watershed

Water Quality

The direct and indirect effects would be the same as in Alternative 2 (No Action).

Water Yield/Timing, Sediment Transport, Watershed Connectivity

The direct and indirect effects would be the same as in Alternative 2 (No Action).

Riparian/Meadow Habitat

The direct and indirect effects would be the same as in Alternative 2 (No Action).

South Fork Stanislaus River Watershed

Water Quality

The direct and indirect effects would be the same as in Alternative 2 (No Action).

Water Yield/Timing, Sediment Transport, Watershed Connectivity

The direct and indirect effects would be the same as in Alternative 2 (No Action).

Riparian/Meadow Habitat

The direct and indirect effects would be the same as in Alternative 2 (No Action).

3.1.3.3.2. Cumulative Effects

All Watersheds

All dams are located within a designated wilderness area. Management activities permitted within the Emigrant Wilderness are limited to activities consistent with maintaining the wilderness character of the area and are described in the 2002 Emigrant Wilderness Management Direction. Impacts associated with maintaining 7 of the 18 existing wilderness dams and not maintaining 11 of the dams, when added to any past, present or reasonably future actions inside the Emigrant Wilderness would not have significant cumulative impacts on water quality, water yield or timing, or riparian resources within the analysis area.

3.1.3.3.3. Other Potential Effects

Clavey River Watershed

Boulders used in the construction of Y-Meadow dam are too large to be removed by high flows and would form a large loose rock check dam in the drainage. The check dam would retain all or most of the sediments stored behind Y-Meadow dam and possibly result in additional sediment accumulation. Even though Y-Meadow dam would be allowed to deteriorate in Alternative 3, it is not expected that the meadow would regain its natural appearance and function over time. As a result, there would be an irreversible loss of up to 20 acres of natural meadow habitat.

All Watersheds

Seven of the existing structures would be retained and repaired and 11 would not be retained. Six of the seven dams that would be retained are streamflow augmentation dams and one is a lake level maintenance dam. All of the streamflow augmentation dams have State permitted use consistent with streamflow augmentation. The lake level maintenance dam at Red Can Lake currently does not have a State permitted use. Retention of this dam would require application to the State for a permit.

Seven of the 11 dams that would not be retained and operated are streamflow augmentation structures with a total permitted use of 1,640 acre-feet that would be forfeited once operation of the dam for downstream streamflow augmentation ceases.

Three of the dams that would not be retrained are meadow maintenance dams and do not store water and do not have a permitted use quantity associated with them.

Table 3-8 Summary of Effects for Alternative 3

Dam (Purpose) ¹	Existing State Permitted Beneficial Use (Change in Permitted Use Resulting from Alternative) Acre-Feet	Existing Dam Storage Capacity (Change in Dam Storage Capacity Resulting from Alternative) Acre-Feet	Surface Area of Lake or Meadow Inundated without Dam (Total Area Inundated with Dam) Acres	Lakeside or Meadow Habitat Restored to Natural (Pre-dam) Condition Acres
Cherry Creek Watershed – East Fork Cherry Creek				
*Snow Lake (SA)	450 (-450)	290 (-290)	32 (40)	8
Bigelow Lake (SA)	460 (0)	320 (0)	40 (50)	0
*Horse Meadow (MM)	0 (0)	2 (-2)	0 (1 est.)	1 (est.)
*Huckleberry Lake (SA)	400 (-400)	480 (-480)	108 (133)	25
Cherry Creek Watershed – North Fork Cherry Creek				
*High Emigrant Lake (SA)	80 (-80)	70 (-70)	6 (10)	4
Emigrant Meadow Lake (SA)	360 (0)	190 (0)	32 (45)	0
*Middle Emigrant Lake (SA)	130 (-130)	90 (-90)	10 (18)	8
Emigrant Lake (SA)	2000 (0)	1470 (0)	145 (195)	0
*Cow Meadow Lake (LL)	150 (-150)	0 ² (0)	42 (60)	0
Cherry Creek Watershed – Middle Fork Cherry Creek				
Red Can Lake (LL)	0 (20 ³)	20 (0)	7 (8)	0
Leighton Lake (SA)	350 (0)	100 (0)	21 (25)	0
*Yellowhammer Lake (LL)	0 (0)	40 (-40)	18 (20)	2
Cherry Creek Watershed – West Fork Cherry Creek				
Long Lake (SA)	520 (0)	380 (0)	54 (67)	0
Lower Buck Lake (SA)	360 (0)	270 (0)	32 (40)	0
Total: Cherry Creek WS	5260 (-1190⁴)	3722 (-972⁵)		48⁶
Clavey River Watershed – Lily Creek				
*Y-Meadow Lake (SA)	180 (-180)	180 (-180)	0 (20)	0 ⁷
*Bear Lake (SA)	250 (-250)	190 (-190)	18 (24)	6
Total: Clavey River WS	430 (-430)	370 (-370)		6
South Fork Stanislaus River Watershed – South Fork Stanislaus River				
*Cooper Meadow (MM)	0 (0)	0 (0)	0 (0)	0
*Whitesides Meadow (MM)	0 (0)	30 (-30)	0 (3 est.)	3 (est.)
Total: South Fork Stanislaus River WS	0	30 (-30)		3

*Dam that would not be retained, maintained, or operated.

¹ SA – Streamflow Augmentation Dam; MM – Meadow Maintenance Dam; LL – Lake Level Maintenance Dam

² Main dam at Cow Meadow Lake washed out; therefore, existing storage capacity is 0.

³ No existing State permitted beneficial use. Use would require filing with State

⁴ Forfeiture of permitted water use through abandonment (non-maintenance and non-operation) of dams.

⁵ Loss of all storage capacity through abandonment (non-maintenance) of dams.

⁶ Restoration of lakeside habitat does not occur for dams that would be retained. The value shown represents the difference between total surface area inundated at maximum pool elevation for the dams that would not be retained and the natural surface area of the lakes/meadows (i.e., area inundated without the dam).

⁷ Assume original meadow habitat is irretrievably lost due to sedimentation.

3.1.3.4. SUMMARY OF EFFECTS – ALL ALTERNATIVES

Table 3-9 summarizes the direct and indirect effects and other potential effects of the alternatives as discussed in Section 3.1.3.1 through Section 3.1.3.3. There are no cumulative effects resulting from any of the alternatives.

Table 3-9 Summary of Effects – All Alternatives

Alternative	Impairment of Downstream Water Quality and Aquatic Habitat	Restoration of Hydrologic Function, Sediment Transport Processes, Hydrologic Connectivity	Potential Riparian and Meadow Restoration (Acres)	Loss of Existing Water Rights (Acre-Feet)
Cherry Creek Watershed				
Alternative 1 Proposed Action	None – Low	Low	-14	0
Alternative 2 No Action	None – Low	High	+147	-5,260
Alternative 3 Heritage	None – Low	Moderate	+48	-1,210
Clavey River Watershed				
Alternative 1 Proposed Action	None - Low	Moderate	+6	-250
Alternative 2 No Action	None - Low	Moderate	+6	-430
Alternative 3 Heritage	None - Low	Moderate	+6	-430
South Fork Stanislaus River Watershed				
Alternative 1 Proposed Action	None – Low	High	+3	0
Alternative 2 No Action	None - Low	High	+3	0
Alternative 3 Heritage	None - Low	High	+3	0

3.1.3.5. BEST MANAGEMENT PRACTICES (BMP)

A BMP is a practice, or a combination of practices, which is determined to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals.

BMPs applicable to all action alternatives included in this analysis are listed below:

1. Erosion Control Plan

Limit and mitigate erosion and sedimentation associated with dam repair and maintenance from entering lakes or streams. Before maintenance of any structure, the Forest would

develop a plan, which, among other things, sets forth site-specific erosion control measures that mitigate land-disturbing activities that may result in short-term erosion during and following project implementation.

2. Control of Maintenance Activities within Riparian Conservation Areas (RCAs)

Protect water quality by controlling repair and maintenance actions within RCA so that the following functions are not impaired:

- Acting as an effective filter for sediment generated by erosion from bare surfaces.
- Maintaining shade, riparian habitat (aquatic and terrestrial), and channel stabilizing effects.
- Keeping the floodplain surface in a resistant, undisturbed condition to slow water velocities and limit erosion by flood flows.

3. Minimize Lake and Stream Channel Disturbances and Related Sediment Production

Work would occur during low flow periods in streams important for fisheries or other aquatic resources. Work would not be allowed during spawning periods or other periods critical to aquatic resources. Dam maintenance activities must follow all of the following minimum water quality protection measures:

- The natural streambed or lake bottom adjacent to the structure would not be disturbed without prior approval by the Forest hydrologist or aquatic biologist.
- If the channel or lake bottom were disturbed during construction, it would be restored to its original configuration while minimizing any additional disturbance.
- Disturbance of stream or lake banks are kept to a minimum and disturbed banks are stabilized upon completion of work.
- Keep materials (e.g., cement/lime) used in dam repair, and maintenance out of lakes and channels.
- Remove any materials stacked or stockpiled in floodplain immediately following project completion.

3.2. WILDERNESS

3.2.1. Wilderness Background Information

3.2.1.1. LEGISLATIVE BACKGROUND OF THE EMIGRANT WILDERNESS

The establishment and management of the Emigrant Wilderness on the Stanislaus National Forest has been determined through a series of Congressional Acts, Forest Service policy,

and site-specific management direction developed for the Emigrant Wilderness. A brief description of each Act, the enabling legislation, and Forest Service policy and direction is necessary to understand the values of Wilderness and management constraints. It is not the objective of this section to interpret where Congressional intent is present or lacking.

3.2.1.2. THE WILDERNESS ACT OF 1964

On September 3, 1964, President Lyndon Johnson signed the Wilderness Act into law. It was a milestone in the history of conservation, as it was the nation's first legislative attempt to define the need for wilderness, preservation, use, and management. The Act's definition of wilderness and its purpose and special provisions are important as they relate to managing the dams in the Emigrant Wilderness

3.2.1.2.1. The Definition of Wilderness

Section 2(c) of the Act defines wilderness as:

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements¹ or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and, (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

3.2.1.2.2. The Purpose of Wilderness

In 1964, Congress was aware that increasing population and growth could result in virtually no lands existing that had not been altered from their natural condition. Those statements are important to managing the Emigrant Wilderness. This vision, in Section 2(a) of the Act, states:

In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness

¹ Permanent structure is a structural or nonstructural improvement that is to remain at a particular location for more than one field season. Permanent improvements include such items as trails, toilet buildings, cabins, fences, tent frames, fire grills, and instrumentation stations (Forest Service Manual 2320.5.3, p.9).

Preservation System to be composed of federally owned areas designed by Congress as "wilderness areas", and these shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness; and no Federal lands shall be designated as "wilderness areas" except as provided for in this chapter or by a subsequent Act.

3.2.1.2.3. The Prohibition of Certain Uses

Section 4(c) of the Act broadly identifies prohibitions within Wilderness.

Except as specifically provided for in this chapter, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this chapter and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this chapter (including measures required in emergencies involving health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

3.2.1.3. PUBLIC LAWS 93-632 AND 98-425.

While the Wilderness Act of 1964 provides the direction and parameters for protecting and managing wilderness, two Congressional Acts created the Emigrant Wilderness. On January 3, 1975, 106,988 acres were designated by Public law 93-632. On September 28, 1984, Public law 98-425 designated an additional 6,100 acres as part of the Emigrant Wilderness. Congress, which sometimes includes what the disposition of the non-conforming structures and uses should be, did not address the Emigrant dams in either Act.

3.2.1.4. LEGISLATIVE HISTORY

The recommendation and report to Congress for the Emigrant Wilderness was submitted on September 1, 1971 by the former Chief of the Forest Service, Edward Cliff. On September 29, 1977, the recommendation was approved by the (former) Secretary of Agriculture, Clifford Hardin. In this report to Congress, there are statements regarding the Forest Service's intent to manage and maintain the dams. "Ten existing flow maintenance dams are under permit to the California Department of Fish and Game. Continued maintenance and operation of these dams (by hand) will be allowed."

On March 19, 1974, former Forest Service Deputy Chief Thomas Nelson, in his testimony at the Hearing before the Senate Subcommittee for Public Lands of the Committee on Interior and Insular Affairs stated, "This is an important watershed area. There are lots of bare rock, and it should be protected because of the importance for water supply to the city and county of San Francisco and others is quite important. There are a few minor improvements within the area. Helicopters are allowed under previous use to take snow measurements. We think the existing weirs and flow maintenance dams are inconspicuous and their maintenance will be permitted."

House Report 93-989 (April 11, 1974), which accompanied House Resolution 12884, provided a reference to the dams "... water production will not be curtailed. Certain small weirs and flow dams are present, but are essentially unnoticeable." An additional statement reads, "Within the area recommended for wilderness designation there are drift fences (5 miles) which will be maintained, but several cabins and barns will be removed within 10 years. Two snow cabins will be retained. The weirs and small dams will likewise be retained."

Senate Report 93-1043 (July 30, 1974 and which became Public Law 93-632) includes a section that reads, "Within this 100,000 acres are several man-made developments. There are two well hidden snow cabins and snow courses and several cabins and barns for managing livestock. Except for the inconspicuous snow cabins and snow courses the other structures will be removed within 10 years after the area is classified as Wilderness. In addition there are a number of small inconspicuous flow-maintenance dams and weirs made of natural rock and covered with moss and lichens. They are substantially unnoticeable."

The issue of whether it was Congressional intent that these structures be managed and maintained has been the topic of many debates. The presence of the dams did not detract from the designation of the area as wilderness in 1974, and the enabling legislation did not include any special provisions related to the management of the dam structures within the Emigrant Wilderness.

3.2.1.5. WILDERNESS OBJECTIVES AND POLICY

The Forest Service has both objectives and policy for managing wilderness that apply to this analysis (FSM 2320.2-3).

The objectives are:

1. Maintain and perpetuate the enduring resource of wilderness as one of the multiple uses of National Forest System land.
2. Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces.
3. Minimize the impact of those kinds of uses and activities generally prohibited by the Wilderness Act, but specifically excepted by the Act or subsequent legislation.
4. Protect and perpetuate wilderness character and public values including, but not limited to, opportunities for scientific study, education, solitude, physical and mental challenge and stimulation, inspiration, and primitive recreation experiences.
5. Gather information and carry out research in a manner compatible with preserving the wilderness environment to increase understanding of wilderness ecology, wilderness uses, management opportunities, and visitor behavior.

Of 11 policy points, the following 4 are most pertinent to this analysis:

1. Where there are alternatives among management decisions, wilderness values shall dominate over all other considerations except where limited by the Wilderness Act, subsequent legislation, or regulations.
2. Manage the use of other resources in wilderness in a manner compatible with wilderness resource management objectives.
3. In wildernesses where the establishing legislation permits resource uses and activities that are nonconforming exceptions to the definition of wilderness as described in the Wilderness Act, manage these nonconforming uses and activities in such a manner as to minimize their effect on the wilderness resource.
4. Cease uses and activities and remove existing structures not essential to the administration, protection, or management of wilderness for wilderness purposes or not provided for in the establishing legislation.

3.2.1.6. THE WILDERNESS MANAGEMENT MODEL

The Wilderness Management Model (Figure 3-1) is a tool used to show the relationship between the natural, undisturbed purity of a wilderness area and the human influence that affects it. The more human influence, the lower the purity of a wilderness. The less human influence on a wilderness, the higher (or purer), the wilderness area could be. The Stanislaus National Forest used the Wilderness Management Model and the Limits of Acceptable Change philosophy to create standards and indicators of change within the Emigrant Wilderness (Emigrant Wilderness Management Plan, 1998, Appendix C).

In absolute wilderness, there is no human influence preventing the area from retaining its purest natural form. It is unlikely; however, that this condition exists anywhere on earth. There are few places, if any, remaining where humans have neither set foot, nor where human influences have not been felt (e.g. pollution). The Wilderness Act defines wilderness at some point below absolute wilderness.

The Act permits certain activities and contains prerogatives that also tend to lessen the opportunities to reach absolute wilderness. Considered together, these modifications define legal wilderness. Each wilderness is to be managed toward attaining the highest level of purity within legal constraints.

Each designated wilderness is affected by an assortment of human influences that vary in intensity. In one area, human influence may be very limited; in another area, major disturbances occur. The number and intensity of these influences cause a gap between the attainable legislative wilderness and the conditions that exist in a wilderness ("X"). The goals of wilderness management are to identify these influences, define their causes, remedy them, and close the gap ("A") between the attainable level of purity and the level that exists in each wilderness ("X").

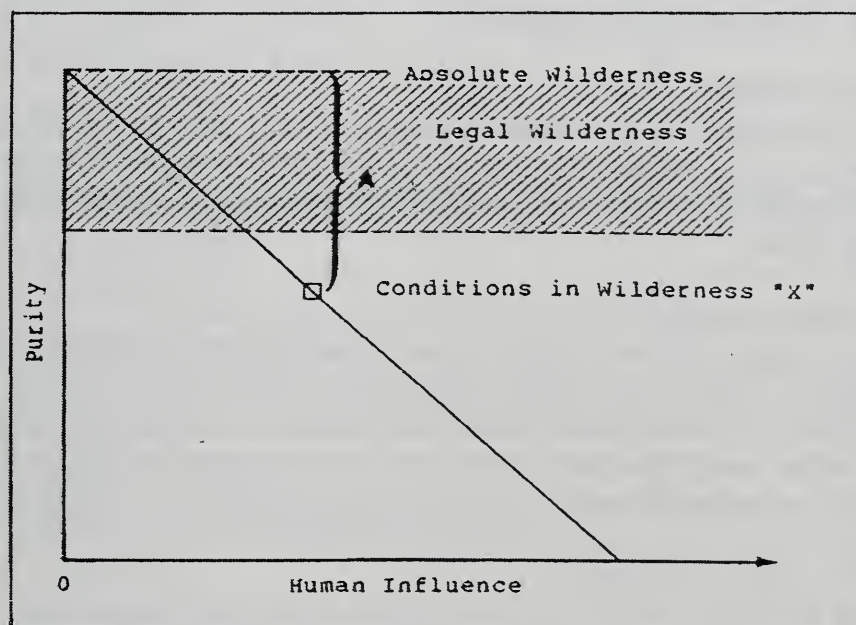
Research published in 1994 (Cole, 1994) used the wilderness model to evaluate the significance of several types of threats to the wilderness resource. The findings indicate water developments in wilderness do pose some "threat" to the attributes of wilderness with aquatic systems and vegetation rating highest for significance of effect. Forest Service policy is clear, where a choice must be made between wilderness values and visitor or any other activity, preserving the wilderness resource is the overriding value. Economy,

convenience, commercial value, and comfort are not standards of management or use of wilderness. Because uses and values on each area vary, management and administration must be tailored to each area. Even so, all wilderness areas are part of one National Wilderness Preservation System and their management must be consistent with the Wilderness Act and their establishing legislation.

Figure 3-1 Wilderness Management Model

2320.6 - Exhibit01

The Wilderness Management Model



3.2.1.7. THE MINIMUM REQUIREMENT DECISION GUIDE

The Minimum Requirement Decision Guide was created to assist wilderness managers with determining:

1. Whether a project or activity is necessary to meet the minimum requirements for the administration of the area.
2. Which tool or method should be used to complete the project that results in the least impact to the physical resource or wilderness values (USDA, Arthur Carhart National Wilderness Training Center, 2000).

The guide is not a NEPA analysis, decision document, or policy, but rather a series of self-explanatory worksheets designed to assist in thinking through an environmental analysis or project. The Deciding Official in this analysis may authorize any of the generally prohibited activities or uses listed in Section 4(c) of the Wilderness Act if they are determined to be the minimum necessary to do the job and meet wilderness management objectives.

To determine what the minimum necessary is for administering wilderness, the effects on the wilderness character is analyzed by looking at several indicators:

1. Biophysical effects
 - The environmental resource issues that would be affected by a project
 - The effects an action would have on protecting natural conditions within the regional landscape (i.e. biological and physical effects, insect, disease, or noxious weed control)
2. Social/recreation/experiential effects
 - How the wilderness experience may be affected by the proposed action
 - The effects to recreation use and wilderness character
 - The effect the proposed action may have on the public and their opportunity for discovery, surprise, and self-discovery
3. Societal/political effects
 - Political considerations (i.e. Memorandums of Understanding, agency agreements, local positions) that may be affected by the proposed action
 - The relationship of the proposed action and method of implementation to applicable laws
4. Health and safety concerns
 - Health and safety concerns that may be associated with the proposed action and alternatives
 - A consideration of the types of tools used, training, certifications, and other administrative needs to ensure a safe work environment for employees
 - The effect the proposed action may have on the health and safety of the public
5. Economic and timing considerations
 - The costs and timing associated with implementing each alternative
 - An assessment of the urgency and potential cumulative effect from this proposal of similar actions

3.2.2. Existing Condition – Background

3.2.2.1. OPPORTUNITY CLASSES

An opportunity class (OC) represents an opportunity in wilderness based on a combination of social, resource, and management conditions. Opportunity classes, which range from I to IV, have been designated for every acre of the Emigrant Wilderness. In an OC I, the objective is to have natural processes operate with little to no human influence or impact. Opportunities for solitude in this OC would be outstanding as OC I represents the most pristine condition of wilderness. As the range progresses from OC I to IV, natural processes and the ecosystem still respond to natural processes; however, localized effects and influences from humans on natural processes and the ecosystem increase, and opportunities for solitude may be less as more interactions and encounters with others are anticipated. As displayed below, each of the 18 dam being analyzed falls within OC II, III, or IV. Map D-3-6 shows the distribution of classes throughout the Emigrant Wilderness (Emigrant Wilderness Management Direction, 2002) (Forest Plan, 2002):

Table 3-10 Opportunity Classes of Dams to be Analyzed

Dam	Opportunity Class
Cherry Creek Watershed – East Fork Cherry Creek	
Snow Lake	III
Bigelow Lake	II
Horse Meadow	III
Huckleberry Lake	III
Cherry Creek Watershed – North Fork Cherry Creek	
High Emigrant Lake	II
Emigrant Meadow Lake	II
Middle Emigrant Lake	II
Emigrant Lake	III
Cow Meadow Lake	III
Cherry Creek Watershed – Middle Fork Cherry Creek	
Red Can Lake	II
Leighton Lake	III
Yellowhammer Lake	II
Cherry Creek Watershed – West Fork Cherry Creek	
Long Lake	II
Lower Buck Lake	III
Clavey River Watershed – Lily Creek	
Y-Meadow	III
Bear Lake	IV
South Fork Stanislaus River Watershed – South Fork Stanislaus River	
Cooper Meadow	III
Whitesides Meadow	III

3.2.2.2. EMIGRANT WILDERNESS STANDARDS AND INDICATORS OF CHANGE

Standards and guidelines have been developed in the Stanislaus National Forest Plan for 20 management components (or prescriptions)¹ within the Emigrant Wilderness. Specific management direction for water developments and structures established the following opportunity class objectives:

(1) The imprint of human influences is:

- I Unnoticeable
- II Unnoticeable in most areas
- III Substantially unnoticeable

¹ Emigrant Wilderness Management Direction, Stanislaus National Forest, April 2002.

IV Substantially unnoticeable

(2) Facilities, structures, and signing may be utilized for:

- I Resource protection when other less obtrusive measures have been exhausted
- II – IV Resource protection, administration, or other wilderness purposes

The four components listed below are used to analyze the effects of the alternatives on wilderness character and values and to determine how well they meet opportunity class objectives. Other management components have been analyzed through the Minimum Requirement Decision Guide (See project file, Stanislaus National Forest, Sonora, CA).

1. Crowding¹
2. Campsite and stock holding area condition
3. Campfire wood and campfires
4. Trails

Specific monitoring indicators have been developed for components 1-3. Indicators assist in determining if the management objectives for each OC are being met. They can also point out a need for some type of management to prevent degradation of the resource. Components 4 and 5 have specific standards and guidelines, but no independent indicators. For this analysis, the indicators for components 1-3 serve to measure whether management objectives are being met.

The OC objectives for the wilderness components are as follows:

3.2.2.2.1. Crowding Opportunity Class Objective

The opportunity for solitude is:

- I Outstanding
- II High to outstanding
- III Moderate to outstanding
- IV Low to outstanding

The measurement indicator for crowding is the maximum number of groups camped per night by destination. See Table 3-11 and 3-12.

Table 3-11 Peak Use Crowding Condition Classes

Condition Class	Standards to Meet Opportunity Class Objectives
I	25% of the class IV standard
II	50% of the class IV standard
III	75% of the class IV standard
IV	The maximum number of groups camped per destination per night (see Table 3-12)

¹ In this section, crowding is being used to determine the opportunity for solitude and is not being used to evaluate the effects to the recreational experience.

Table 3-12 Crowding Indicator by Opportunity Class for Condition Class IV

Dams by Watershed	Opportunity Class	Maximum Number of Groups Camped Per Night
East Fork Cherry Creek		
Snow Lake	III	3
Horse Meadow	III	3
Bigelow Lake	II	2
Huckleberry Lake	III	8
North Fork Cherry Creek		
High Emigrant Lake	II	1
Emigrant Meadow Lake	II	1
Middle Emigrant Lake	II	1
Emigrant Lake	III	7
Cow Meadow Lake	III	4
Middle Fork Cherry Creek		
Red Can Lake	II	1
Leighton Lake	III	3
Yellowhammer Lake	II	2
West Fork Cherry Creek		
Long Lake	II	4
Buck Lakes	III	10
Lily Creek		
Y-Meadow Dam	III	3
Bear Lake	IV	6
Upper South Fork Stanislaus River		
Cooper Meadow	III	4
Whitesides Meadow	III	5

3.2.2.2.2. Campfire Wood and Campfires Opportunity Class Objectives

(1) The imprint of human influences is:

- I Unnoticeable
- II Unnoticeable in most areas
- III Substantially unnoticeable
- IV Substantially unnoticeable

(2) Human influences on soils, vegetation, and woody debris accumulation are:

- I Unnoticeable
- II Unnoticeable in most areas
- III Minimal
- IV Minimal

The measurement indicator for campfire wood and campfires is firewood availability at destination areas. See Table 3-13.

Table 3-13 Firewood Availability Standards¹

Opportunity Class	Stand Density	Firewood Availability Standards
I	Sparse to Poor	All campsites have moderate or more firewood available
	Medium to Good	All campsites have abundant firewood available
II	Sparse to Poor	No more than 15% of campsites have scarce or less firewood available
	Medium to Good	No more than 15% of campsites have moderate or less firewood available
III	Sparse to Poor	No more than 30% of campsites per destination have scarce or less firewood available
	Medium to Good	No more than 30% of campsites per destination have moderate or less firewood available
IV	Sparse to Poor	No more than 50% of campsites per destination have scarce or less firewood available
	Medium to Good	No more than 50% of campsites per destination have moderate or less firewood available

3.2.2.2.3. Campsite & Stock Holding Area Opportunity Class Objectives

The imprint of human influences is:

- I Unnoticeable
- II Unnoticeable in most areas
- III Substantially unnoticeable
- IV Substantially unnoticeable

A. Campsite Condition Indicator

The indicator for campsite condition is measured by ground vegetation, soil, litter, duff, and tree conditions. See Table 3-14.

Table 3-14 Campsite Condition Standards²

Condition Class	Ground Vegetation	Soil, Litter, and Duff	Trees
I	Ground vegetation may be flattened, but will recover quickly.	No bare areas created	No damage or tree root exposure
II	Ground vegetation is reduced or worn away in a small area (<25%) around the center of activity.	Organic litter still present on entire site	No damage or tree root exposure
III	Ground vegetation reduced or worn away on much (25-50%) of the site	Organic litter still present on all but a few places (<25%) on site	Tree roots may be exposed on the surface
IV	Ground vegetation worn away on most (>50%) of the site	Organic litter worn away on most of the site. Extensive areas (>25%) of exposed mineral soil	Tree root exposure may be pronounced.

¹ Emigrant Wilderness Management Plan, 1998, chapter 2, pp 52-53.

² Emigrant Wilderness Management Plan, 1998, chapter 2, pp 46-47.

- In **OC I**, campsites may be in condition class I only.
- In **OC II**, campsites may only be in condition class I or II.
- In **OC III**, campsites may only be in condition class I, II, or III; however, no more than 50% of the sites per destination may be in a condition class III.
- In **OC IV**, campsites may be in condition class I, II, or III.

B. Stock Holding Area Condition Indicator

The indicator for stock holding area condition is measured by ground vegetation, soil, litter, duff, and tree conditions. See Table 3-15.

Table 3-15 Stock Holding Area Condition Standards¹

Condition Class	Ground Vegetation	Soil, Litter, and Duff	Trees
I	Ground vegetation may be flattened, clipped or lightly grazed, but will recover quickly.	Surface litter or duff disturbed.	No damage or tree root exposure.
II	Ground vegetation may be flattened, clipped, or moderately grazed.	Soil surface scraped, hoof marked, or indented.	Minor rubbing or gnawing not severe enough to damage the tree. No tree root exposure.
III	Ground vegetation reduced or worn away on much (25-50%) of the site but will recover by next season.	Minor pawing, displaced sod, or compaction.	Obvious rubbing or gnawing but not severe enough to permanently damage the tree. Tree roots visible on the surface.
IV	Ground vegetation denuded or worn away on most of the site	Major pawing, chiseling, or erosion.	Trees exhibit severe stock induced damage such as rubbing or gnawing which causes breaks in the bark through to the cambium, defoliation or multiple branches broken or removed, and may be dead or dying. Tree roots exposed.

- In **OC I**, stock holding areas may be in condition class I only.
- In **OC II**, stock holding areas may only be in condition class I or II.
- In **OC III**, stock holding areas may only be in condition class I, II, or III; however, no more than 50% of the sites per destination may be in a condition class III.
- In **OC IV**, stock holding areas may be in condition class I, II, or III.

Table 3-16 summarizes the existing condition class level for each destination.

¹ Emigrant Wilderness Management Plan, 1998, chapter 2, pp 48-49.

Table 3-16 Crowding, Campsite, & Stock Area Condition Ratings

Dams	% Of Overnight Use (RVDs)	Condition Class		
		Crowding Condition	Campsite Condition	Stock Area Condition
East Fork Cherry Creek				
Snow	0.80%	Beginning to exceed standard	Meeting standard	Meeting standard
Horse Meadow	0.52%	Beginning to exceed standard	Beginning to exceed standard	Beginning to exceed standard
Bigelow	0.30%	Beginning to exceed standard	Meeting standard	Meeting standard
Huckleberry	3.90%	Beginning to exceed standard	Beginning to exceed standard	Meeting standard
North Fork Cherry Creek				
High Emigrant	0.51%	Beginning to exceed standard	Meeting standard	Meeting standard
Emigrant Meadow	1.59%	Beginning to exceed standard	Meeting standard	Meeting standard
Middle Emigrant	0.32%	Beginning to exceed standard	Meeting standard	Meeting standard
Emigrant	5.50%	Beginning to exceed standard	Beginning to exceed standard	Beginning to exceed standard
Cow Meadow	1.60%	Beginning to exceed standard	Beginning to exceed standard	Beginning to exceed standard
Middle Fork Cherry Creek				
Red Can	0.50%	Beginning to exceed standard	Meeting standard	Meeting standard
Leighton	0.17%	Beginning to exceed standard	No data	Meeting standard
Yellowhammer	0.63%	Beginning to exceed standard	No data	No data
West Fork Cherry Creek				
Long	2.30%	Beginning to exceed standard	Meeting standard	Meeting standard
Buck Lakes	5.00%	Beginning to exceed standard	No data	Exceeds standard
Lily Creek				
Y-Meadow	1.70%	Exceeds standard	Meeting standard	Meeting standard
Bear	3.30%	Exceeds standard	Beginning to exceed standard	Meeting standard
Upper South Fork Stanislaus River				
Cooper Meadow	1.00%	Beginning to exceed standard	No data	No data
Whitesides Meadow	1.40%	Beginning to exceed standard	Meeting standard	Meeting standard

Table 3-17 Trail Access by Opportunity Class and Classification

Dams	Opportunity Class	Trail Classification (Primary, Secondary, Historic Way)
East Fork Cherry Creek		
Snow Lake	III	Primary Trail 21E09 to Secondary Trail 21E10
Horse Meadow	III	Primary Trails 21E11 (Huckleberry Trail) and 21E09
Bigelow Lake	II	Primary Trail 21E11 (Huckleberry Trail) to Primary Trail 21E09 to Horse Meadow to the junction of 21E52 to Secondary Trail 21E52 to Black Bear Lake to Secondary Trail 21E08 to the Bigelow Lake Dams
Huckleberry	III	Primary Trail 21E11 to lower Huckleberry Lake and dam sites
North Fork Cherry Creek		
High Emigrant	II	Primary Trail 21E11 (Huckleberry Trail) to Lunch Meadow over Brown Bear Pass to Emigrant Meadow Lake to Undesignated Route 21E19 to Emigrant Meadow Lake to High Emigrant Lake
Emigrant Meadow	II	Primary Trail 21E11 (Huckleberry Trail) to Lunch Meadow to Primary 21E04 (Lunch Meadow Trail) over Brown Bear Pass to the lake to an undesignated route to the dam site.
Middle Emigrant	II	Primary Trail 21E11 (Huckleberry Trail) to Lunch Meadow to Primary Trail 21E04 (Lunch Meadow) to Emigrant Meadow to Secondary Trail 21E05 Emigrant Meadow to Middle Emigrant to an undesignated route to the west side of lake to the dam site
Emigrant Lake	III	Primary Trail 21E11 (Huckleberry Trail) to Upper Emigrant Lake Primary Trail 21E09 (Crabtree Trail) to the lower end of Emigrant Lake to Undesignated Route 21E21 to dam site
Cow Meadow	III	Primary Trail 20E17 to Upper Cow Meadow to Undesignated Route 21E21 on north side of lake to dam site
Middle Fork Cherry Creek		
Red Can	II	Primary Trail 20E17 (Crabtree Trail) to un-named Historic Way to Cross-Country (no trail)
Leighton	III	Primary Trail 20E17 (Crabtree Trail) to Wood Lake to Historic Way 20E26 to an undesignated route to Leighton Lake dam site
Yellowhammer	II	Primitive and cross-country routes from Historic Way 20E18
West Fork Cherry Creek		
Long	II	Primary Trail 20E14 (Burst Rock Trail) to Deer Lake to Undesignated Route 20E36 to dams
Lower Buck	III	Primary Trail 20E17 (Crabtree Trail) to Upper Wood Lake to Secondary Trail 20E16 to un-named short cross-country walk to dam site
Lily Creek		
Y-Meadow	III	North route – Bear Lake Spur Trail 19E09 to un-named historic way South route – un-named historic way to Bear Lake Spur Trail 19E09
Bear	IV	Crabtree Tree Trail 20E16 to un-named historic way
Upper South Fork Stanislaus River		
Cooper Meadow	III	Primary Trail 20E15 to Historic Way Trail 20E15
Whitesides Meadow	III	Primary Trail 20E14 (Burst Rock Trail) to Historic Way

3.2.2.2.4. Trails Opportunity Class Objectives:

(1) The imprint of human influences is

- I Unnoticeable
- II Unnoticeable in most areas
- III Substantially unnoticeable
- IV Substantially unnoticeable

(2) Trails

- I ...are rare to non-existent, consisting of historic ways
- II ...are few, consisting of non-system historic ways and secondary trails
- III ...may be common, consisting of non-system historic ways, and secondary and primary system trails
- IV ...may be common, consisting of non-system historic ways, and secondary and primary system trails

3.2.2.3. EMIGRANT MANAGEMENT & MONITORING SINCE 1996

Several management actions have occurred since the release of the Emigrant Wilderness Management Direction in 1998.

- Inventory and monitoring has been conducted throughout the Emigrant Wilderness. A review of field data records indicates some level of inventory occurred in 1997, 1998, 1999, 2001, and 2002¹. Indicators that have been measured include crowding, campfire wood and campfires, campsite condition, and stock holding area condition.
- A mandatory overnight wilderness permit system is in place. The permit system tracks visitor itineraries by date and destination. The system is a means to avoid any area from exceeding capacity (having more groups per night than the resource can sustain).
- Because of stock holding area condition monitoring, two lakes with dams have stock use restrictions. The intent is to protect vegetation and soils around these popular areas. Overnight stock holding is prohibited within ¼ mile of Bear Lake and not more than four animals per group may spend the night within the ¼ mile of Long Lake.
- Because of stock holding area condition monitoring, drift fences have been constructed at three areas with dams: Horse Meadow, Huckleberry Lake, and Cow Meadow. The objective of drift fences is to disperse the impact of stock by offering an unconfined (but managed) area for grazing and overnight holding.
- Group size regulations are in place:
 - ♦ The maximum number is 15 people
 - ♦ The maximum number of pack and saddle stock is 25
- No campfires are allowed above 9,000 feet and no campfires are allowed within ½ mile of Emigrant Lake.
- The number of camping nights per trip at Bear Lake is one night.

¹ Of the data reviewed, field reports from 1997 have not been converted to the current format. In addition, all inventory completed from 1997 to the present has not yet been compiled into a report that would provide a summary on whether the indicators had changed (positively or negatively). A more thorough evaluation of all data is needed to determine whether thresholds are changing.

3.2.3. Existing Condition

East Fork Cherry Creek Watershed

Snow Lake

Snow Lake was monitored in 1997 and 2002. Snow Lake is in OC III where opportunities for solitude should be moderate to outstanding. Use at the lake is considered moderate and accounts for 0.80% of the total overnight use for the Emigrant. Three groups per night are allowed within the area and there are 16 sites. Of the 16 sites, approximately 8 of the 16 are within 50 feet of water and have partial screening. The opportunity for solitude is reduced at these sites. However, there is the ability to find a site to the north and east end of the lake which are farther apart and fewer in number than those found on the west side of the lake. In addition, the low number of groups permitted increases opportunities for solitude.

Monitoring inventory from 1997 and 2002 indicates firewood availability ranges from none to moderate. Although there is a campfire restriction at Snow Lake, inventory indicates illegal fires are occurring. Of the 14 sites inventoried in 2002, 15 fire rings were found. This is an increase of one since 1997. The firewood availability standard for this OC is not being met¹.

In 2002, 14 of 16 campsites were inventoried. Campsite condition data from 2002 indicates the condition standard is being met in this OC.

Data from 1997 indicates stock use occurred in at least three sites. Although this indicator was not specifically monitored in 2002, stock use was apparent in two sites. There appears to be suitable sites for stock and it is likely the condition standard is being met.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Access to Snow Lake is from Primary Trail 21E09 to Secondary Trail 21E10. Field reconnaissance was conducted in September of 2002 and this trail was found to be in good condition, meeting the standards for this OC.

Bigelow Lake

Bigelow Lake was monitored in 1997 and 2002. It is in OC II where opportunities for solitude should be high to outstanding. Two groups per night are allowed at the lake and monitoring inventory indicates there are eight sites. The majority of the sites are located on the north and west sides of the lake. Use is estimated to be 0.3% of the total overnight use for the Emigrant. Low use, combined with the very low number of groups allowed per night, should provide many opportunities for solitude.

Firewood availability data from 2002 indicated three of the sites have no availability and four have sparse availability. The campfire restriction is not being fully practiced and three sites showed evidence of fire use; therefore, the firewood availability standard is being exceeded at this lake.

¹ Of the 14 sites monitored in 2002, 13 have none to sparse firewood availability (over 30% of total campsites).

In the 1998 Emigrant Wilderness Management Plan EIS, Bigelow Lake was assigned a campsite condition and stock holding condition rating of III. Inventory data from 2002 indicates sites are within the campsite condition standard for this OC and have improved since 1996¹.

Because stock use holding condition was not specifically monitored, the current condition rating is unknown; however, 2002 field notes indicate stock use is evident in three of the eight sites. One site has resource damage because of improper stock use techniques.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

The most direct access to the Bigelow Lake dam is from Primary Trail and low-use secondary trails (refer to Table 3-17 for the specific route). No historic ways or undesignated user routes would be used. Field reconnaissance in September of 2002 and discussion with the Forest Wilderness Specialist indicate the primary routes are in good to excellent condition. Portions of the secondary routes have excessive trail grades. If use level increases, there may be a need for reconstruction in these areas to minimize erosion.

Horse Meadow

Horse Meadow was monitored in 1997. It is in OC III where opportunities for solitude should be moderate to outstanding. Three groups per night are allowed within the meadow and there are eight sites. At least one site is suitable for larger groups and has been used in the past to support trail maintenance work groups. Overnight use is estimated to be 0.52% of the total overnight use for the Emigrant and there is the ability to disperse use throughout the meadow. In addition, the low number of groups allowed per night allows for increased opportunities for solitude.

There is no conclusive firewood availability data from 1997 and it is unknown if the firewood availability standard for this OC is being met.

In the 1998 Emigrant Wilderness Management Plan EIS, Horse Meadow was assigned a campsite condition rating of IV. It is unknown what the current condition rating is; however, the monitoring reports indicate that five out of eight sites have reoccurring stock use.

In the 1998 Emigrant Wilderness Management Plan EIS, Horse Meadow was assigned a stock area condition rating of IV+. Drift fences were constructed at this site to disperse the impact of stock, as they offer an unconfined (but managed) area for grazing and overnight holding. Data from 1997 indicates stock use occurred in at least three sites. Although this indicator was not specifically monitored in 2002, stock use was noted in two sites. There appears to be suitable sites for stock and the condition standard is most likely being met for this OC.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Access to Horse Meadow is from the Huckleberry Trail (Primary Trail 21E09). Field reconnaissance was conducted in September of 2002. This trail system receives routine

¹ Seven out of eight sites were monitored. Sites rated either in condition class I or II.

maintenance and reconstruction. It is in excellent condition and within the standards for this OC.

Huckleberry Lake

Huckleberry Lake was monitored in 1998 and 2002; however, 2002 data is incomplete as only one site was inventoried. The lake is in OC III where opportunities for solitude should be moderate to outstanding. Eight groups per night are allowed at any one time and monitoring inventory indicates there are 41 sites evenly distributed along each shore. Use is considered high (relative to the overall Wilderness use) and is estimated to be 3.90% of the total overnight use for the Emigrant. The high availability of sites and low number of groups allowed per night should allow for many opportunities for solitude.

Firewood availability data from 2002 is incomplete and it is unknown if the standard is being met for this OC.

In the 1998 Emigrant Wilderness Management Plan EIS stated Huckleberry Lake was beginning to exceed standards for campsite condition and met standards for stock holding condition. Campsite condition inventory data from 1998 indicates 32 sites were inventoried and over half met standards. Although there is no conclusive data from the 2002 inventory, it is possible conditions have continued to improve and the sites meet the campsite condition class standard for this OC.

Because stock use holding condition was not specifically monitored, it is unknown what the current condition rating is and if the standard is being met.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Trail access to the dams is on Primary Trail 21E11 (Huckleberry Trail) to Primary Trail 21E09 to Horse Meadow to the junction of 21E52 to Secondary Trail 21E52 to Black Bear Lake to Secondary Trail 21E08 to the Bigelow Lake Dams. No use on historic ways or undesignated routes is needed to access the dams. The primary and secondary trails meet the OC standard.

North Fork Cherry Creek Watershed

High Emigrant Lake

High Emigrant Lake was monitored in 1997. The lake is in OC II where opportunities for solitude should be high to outstanding. One group per night is allowed at any one time and monitoring inventory indicates there are seven sites. Four of the sites are located south of the lake and three sites are north of the lake. Use is considered low and estimated to be 0.51% of the total overnight use for the Emigrant. The lake area is located above tree line with little vegetative screening available. However, the restriction of one group allowed per night and the number and variety of sites should maximize opportunities for solitude.

A fire restriction is in place and the 1997 monitoring inventory did not indicate any fire use. It is unknown if the restriction is resulting in the desired condition for resource protection.

In the 1998 Emigrant Wilderness Management Plan EIS, High Emigrant Lake was assigned a campsite condition of II and a stock holding condition rating of I. Campsite condition

inventory data from 1997 indicates the seven sites were in condition class I and II. Although there is no current data, field reconnaissance in September of 2002 indicated no change in the type or volume of use. It is highly likely the lake sites continue to meet the campsite condition standard for this OC.

Because stock use holding condition was not specifically monitored in 1997, the current condition rating is unknown. Field reconnaissance in September of 2002 indicated low levels of stock use. It is likely the condition class standard is being met.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Trail access to the dams utilize Primary Trail 21E11 (Huckleberry Trail) to Lunch Meadow over Brown Bear Pass to Emigrant Meadow Lake to a very faint Undesignated Route 21E19 which leads to the dam sites. The primary trail meets OC standards. At this time, the undesignated use route is not degrading into a higher class of trail.

Emigrant Meadow Lake

Emigrant Meadow Lake was monitored in 1997. The lake is in OC II where opportunities for solitude should be high to outstanding. One group per night is allowed at any one time and monitoring inventory indicates there are 10 sites. Most of the sites are distributed on the west and east sides of the lake. Use is considered moderate and estimated to be 1.6% of the total overnight use for the Emigrant. There is minimal screening for sites; however, the restriction of one group allowed per night and the number and variety of sites should maximize opportunities for solitude.

A fire restriction is in place. The 1997 monitoring inventory did indicate fire use in at least 4 of the 10 sites. It is unknown if the restriction is resulting in the desired condition for resource protection.

In the 1998 Emigrant Wilderness Management Plan EIS, Emigrant Meadow Lake was assigned a campsite condition of II and a stock holding condition rating of I. Campsite condition inventory data from 1997 indicates the seven sites were in condition class I and II. Although there is no current data, field reconnaissance in September of 2002 indicated no change in the type or volume of use. It is highly likely the sites continue to meet the campsite condition standard for this OC.

Because stock use holding condition was not specifically monitored in 1997, the current condition rating is unknown. Field reconnaissance in September of 2002 indicated low levels of stock use. It is likely the condition standard is being met for this OC.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Trail access to the dams utilize Primary Trail 21E11 (Huckleberry Trail) to Lunch Meadow over Brown Bear Pass to Emigrant Meadow Lake. The primary trails meet the OC standard.

Middle Emigrant Lake

Middle Emigrant Lake was monitored in 1997. The lake is in OC II where opportunities for solitude should be high to outstanding. One group per night is allowed at any one time. Monitoring inventory indicates there are six sites. Most sites, which have minimal screening, are distributed on the south and east sides of the lake. Use is considered low and estimated to be 0.32% of the total overnight use for the Emigrant. However, the restriction of one group allowed per night and the number of available sites should maximize opportunities for solitude.

A fire restriction is in place. The 1997 monitoring inventory indicated fire use in at least three of the six sites. It is unknown if the restriction is resulting in the desired condition which is resource protection.

In the 1998 Emigrant Wilderness Management Plan EIS, Middle Emigrant Lake was assigned a campsite condition of II and a stock holding condition rating of II. Campsite condition inventory data from 1997 is inconclusive and the campsite condition class is unknown. It is highly likely the lake continues to meet the campsite condition class standard.

Because stock use holding condition was not specifically monitored in 1997, the current condition rating is unknown. Field reconnaissance in September of 2002 indicated low levels of stock use and very few suitable areas where stock could be held overnight. It is likely the condition class standard is being met.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Two well-maintained primary trails access the lake: 21E11 (Huckleberry Trail) to Lunch Meadow and 21E04 (Lunch Meadow) to Emigrant Meadow. Secondary Trail 21E05, which goes to Middle Emigrant, is infrequently maintained, very rocky, and a challenge for stock. An undesignated route to the west side of lake would then be used to access the dams. The primary and secondary trails meet OC standards. Currently, the undesignated route is not degrading into a higher class of trail.

Emigrant Lake

Emigrant Lake was monitored in 1997, 1998, and 2001. The lake is in OC III where opportunities for solitude should be moderate to outstanding. Seven groups per night are allowed at any one time. Monitoring inventory indicates there are approximately nine sites with most sites distributed on the south and west sides of the lake. Use is considered high and estimated to be 5.50% of the total overnight use for the Emigrant¹. Although there is vegetative screening for sites, the number of groups allowed per night and the relatively few number of sites may not offer an opportunity for solitude.

In 1992, a fire restriction was put in place within ½ mile of the lake. Eight of nine sites were inventoried in 2001. The lake is still exceeding the firewood availability standard and evidence of fire use was found in seven of the eight inventoried sites. It is unknown whether the fire restriction has resulted in the desired condition of resource protection.

¹ Emigrant Lake has the highest use of the 18 lakes with dams. Following Emigrant Lake is Buck Lakes with 5.00% and Huckleberry Lake with 3.90% of the overall total night use in the Emigrant.

In the 1998 Emigrant Wilderness Management Plan EIS stated Emigrant Lake was beginning to exceed standards for campsite condition and stock holding condition. Campsite condition inventory data from 2001 indicated three sites met standards for campsite condition and four sites are beginning to exceed standards. Vegetation recovery was noted in several sites.

Because stock use holding condition was not specifically monitored in 1997 or 2001, the current condition rating is unknown. Inventory indicates at least three sites have had stock use. It is unknown if the condition class standard is being met.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Trail access is from Primary Trail 21E11 (Huckleberry Trail) to Upper Emigrant Lake to Primary Trail 21E09 (Crabtree Trail) to the lower end of Emigrant Lake. From this point, undesignated route 21E21 is used to the dam site. Both primary trails meet the OC standard. At this time, the undesignated use route is not degrading into a higher class of trail.

Cow Meadow Lake

Cow Meadow Lake was monitored in 1999; however, the quality of the data made the inventory inconclusive. The lake is in OC III where opportunities for solitude should be moderate to outstanding. Four groups per night are permitted at any one time. The 1999 monitoring map indicates there are approximately five sites. Use is considered moderate and estimated at 1.60% of the total overnight use for the Emigrant. Given the overall use, the number of groups per night, and the relatively limited number of sites, an opportunity for solitude may be diminished or lacking.

It is unknown whether Cow Meadow Lake is meeting the firewood availability standard for this OC.

In the 1998 Emigrant Wilderness Management Plan EIS stated Cow Meadow Lake was beginning to exceed standards for campsite condition and stock holding condition. Although there is no campsite inventory data available, field reconnaissance in September and October of 2003 was completed. Three sites met the standards for campsite condition class. It is likely that the campsite condition standard is being met for this OC.

Stock use holding condition inventory is not available. However, field reconnaissance in 2002 indicated stock use is present. Damage to trees from tying directly to them, as well as the use of high-lines, has been used as stockholding methods. A drift fence has been constructed at this lake to disperse the impact of stock by offering an unconfined (but managed) area for grazing and overnight holding. It is unknown if the condition class standard is being met or if the presence of the drift fence is benefiting the resource.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Trail access is on the well-maintained Primary Trail 20E17 until Cow Meadow Lake is reached. To access the dam site, Undesignated Use Route 21E21, which follows the north side of the lake, would be followed. This route is faint, receives little use, and passes

through riparian vegetation and habitat. The primary trail meets the OC standard and the undesignated use route is not degrading into a higher class of trail.

Middle Fork Cherry Creek Watershed

Red Can Lake

Red Can Lake was monitored in 1997. The lake is in OC II where opportunities for solitude should be high to outstanding. Two groups per night are allowed at any one time. The 1997 monitoring data indicates there are approximately seven sites with the potential for additional sites. Use is considered low and estimated at 0.5% of the total overnight use for the Emigrant. Factors such as the low use rates, the small number of groups permitted per night, and the number of sites should provide many opportunities for solitude.

Firewood availability condition was not specifically measured in 1997. The field notes indicate that there is fire use in five of the seven sites. It is unknown whether Red Can Lake meets the firewood availability standard for this OC.

In the 1998 Emigrant Wilderness Management Plan EIS, Red Can Lake meets the standards for campsite condition and stock holding condition. In 1997, 50% of the established sites were in condition class III, which exceeded the OC standard. It is unknown if the lake is currently meeting campsite condition standards. However, field reconnaissance in 2002 indicated several sites had received little use and were revegetating. Likewise, stock use holding condition inventory is not available and it is unknown if the area is meeting the condition standard. Field reconnaissance in 2002 indicated past stock use is evident and there is at least one site suitable for holding stock.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

The majority of the trail access is on the well-maintained Primary Trail 20E17. However, the use of an un-named Historic Way is used to access Karl's Lake, and from Karl's Lake the route is cross-country, as no designated trail is in place. The primary trail is within the OC standards. Currently, the historic way is not degrading into a higher class of trail and a well-defined route from Karl's Lake to Red Can Lake does not exist.

Leighton Lake

Leighton Lake was monitored in 1997. The lake is in OC III where opportunities for solitude should be moderate to outstanding. Three groups per night are allowed at any one time. The 1997 monitoring data indicates there are approximately six sites with the potential for additional sites. Use is considered low-to-moderate and estimated at 0.5% of the total overnight use for the Emigrant. Factors such as the low use rates, the moderate number of groups permitted per night, and a sufficient number of sites well distributed long the length of the south shore should provide many opportunities for solitude.

Firewood availability condition was not specifically measured in 1997. The field notes indicate that there was fire use in all six sites. It is unknown whether Leighton Lake meets the firewood availability standard.

In the 1998 Emigrant Wilderness Management Plan EIS, Leighton Lake meets the standards for stock holding condition. In 1997, the campsites were in campsite condition I

and II and met the OC standards. It is unknown if the lake is still meeting campsite standards. Likewise, stock use holding condition inventory is not available and it is unknown if the area is meeting the condition standard.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Trail access is Primary Trail 20E17 to Wood Lake. Historic Way 20E26 and an Undesignated route (no assigned number) used to access the dam site. The primary and historic way routes meet the OC standard and the undesignated route does not show signs of degrading into a higher trail class.

Yellowhammer Lake

Yellowhammer Lake was monitored in 1997. The lake is in OC II where opportunities for solitude should be high to outstanding. Two groups per night are allowed at any one time. The 1997 monitoring data indicates there are approximately 10 sites distributed along the western shore. Use is considered low and estimated at 0.63% of the total overnight use for the Emigrant. Factors such as the low use rates, the low number of groups permitted per night, and the number and variety of sites provide many opportunities for solitude.

Firewood availability condition was not specifically measured in 1997. The field notes indicate there was fire use in 50% of the sites. It is unknown whether Yellowhammer Lake meets the firewood availability standard for this OC.

In the 1998 Emigrant Wilderness Management Plan EIS, Yellowhammer Lake was not assigned a campsite or stock holding condition rating. In 1997, over 50% of the campsites were in campsite condition I and II and met the OC standard. Two sites exceeded the standard. The degree of campsite condition change, and whether the lake meets the OC standard, is unknown. Likewise, stock use holding condition inventory is not available. It is unknown if the area is meeting the condition standard.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Trail access is on Historic Way 20E18 and un-designated cross-country routes. The historic way route meets the OC standard. No route to the dam is degrading into a higher trail class.

West Fork Cherry Creek Watershed

Long Lake

Long Lake was monitored in 2002. The lake is in OC II where opportunities for solitude should be high to outstanding. Four groups per night are allowed at any one time. The 1997 monitoring map (with no accompanying data) indicates there were approximately 12 sites (The 2002 data noted 22 sites). Use is considered high (relative to the overall use in the Emigrant) and estimated at 2.30% of the total overnight use for the Emigrant. Given the number of campsites, which are well distributed along the length of the western and southern shore, and the number of groups permitted per night, there should be many opportunities for solitude.

Firewood availability condition was measured in 2002. Data indicates 18 of 22 sites have scarce to no available firewood. The firewood availability standard is being exceeded in this OC.

In the 1998 Emigrant Wilderness Management Plan EIS, Long Lake meets the standards for campsite condition and stock holding condition. Monitoring inventory from 2002 indicates 11 out of 22 sites are in campsite condition III and IV. The campsite condition standard is not being met in this OC. Data indicates three sites are receiving stock use; however, it is unknown if the stock use holding condition standard is being met for this OC.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Trail access is on Primary Trail 20E14 (Burst Rock Trail) to Deer Lake. From Deer Lake, Undesignated Route 20E36 is used to access the dams. The primary trail meets the standard for this OC. Field reconnaissance in October of 2002 did not indicate there is one route that is used by visitors to reach Long Lake from the junction with Deer Lake. The area had several cairn routes that led to the lake. At the lakeshore, the undesignated use route appears to be degrading into a well-established secondary trail. This class of trail would still meet the OC standard.

Lower Buck Lake

Lower Buck Lake was monitored in 1992 and 1997. The lake is in OC III where opportunities for solitude should be moderate to outstanding. Ten groups per night are allowed at any one time throughout the Lower Buck Lake, Upper Buck Lake, and Buck Meadows corridor. The 1997 monitoring data indicates there were approximately 19 sites in the immediate Lower Buck Lakes area. Eight of these sites were monitored. Use is considered moderate-to-high (relative to the overall use in the Emigrant) and estimated at 5.0% of the total overnight use for the Emigrant. If groups are evenly dispersed within the entire Buck Lakes corridor, the opportunity for solitude would exist. However, if groups concentrate at Lower Buck Lake, the opportunity for solitude would be diminished and may be difficult to attain.

The firewood availability condition was not specifically measured in 1997. Of the eight sites inventoried, five showed signs of fire use. It is unknown if the firewood availability standard is being met in this OC.

In the 1998 Emigrant Wilderness Management Plan EIS, no campsite or stocking holding condition rating was assigned. Monitoring inventory from 2002 indicates over 50% of the sites inventoried are within condition class I and II. At Lower Buck Lake, the campsite condition standard is being met in this OC. Data did not indicate stock use. This may be because most of the stock use occurs in the Upper Buck Lake and Buck Meadows area. Drift fences have been installed in this area to provide an unconfined method of stock holding.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Access is on Primary Trail 20E17 (Crabtree Trail) to Upper Wood Lake. From this point, Secondary Trail 20E16 is used for approximately ¼ mile and a short (100 yard) cross-

country route is required to get to the dam site. Both primary and secondary trails meet the OC standards. Field reconnaissance in 2002 indicates there is no established or apparent route to the dam.

Lily Creek Watershed

Y-Meadow Dam

Y-Meadow Dam was monitored in 1997 and 2002. The lake is in OC III where opportunities for solitude should be moderate to outstanding. Three groups per night are allowed at Y-Meadow. The 2002 monitoring data indicated there are approximately 20 sites with the majority distributed on the northern and eastern sides of the dam. Use is considered moderate (relative to the overall use in the Emigrant) and estimated at 1.7% of the total overnight use for the Emigrant. With the existing number of sites and the few groups allowed per night, there are many opportunities for solitude.

Firewood availability condition was measured in 2002. Sixteen of 20 sites have no firewood or have scarce firewood. The firewood availability standard is being exceeded in this OC.

In the 1998 Emigrant Wilderness Management Plan EIS, stated Y-Meadow meets the standards for a campsite condition and stocking holding condition. Monitoring inventory from 2002 indicates 16 of 20 sites meet standard. The campsite condition standard is being met in this OC. Data indicated that one site had evidence of stock use; however, no measure of the stock holding condition was provided. It is unknown if the standard is being met in this OC.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Access is on Primary Trail 20E14 (Burst Rock Trail) to Secondary Trail 19E09. Use on an un-named historic way is needed to access the dam site. The primary and secondary trail meets the OC standards. Information provided by Forest personnel indicates the historic way is not degrading into a secondary trail.

Bear Lake

Bear Lake was monitored in 1998. The lake is in OC IV where opportunities for solitude should be low to outstanding. Six groups per night are allowed at Bear Lake. In addition, there is a one-night maximum stay at the lake. The 1998 monitoring data indicated there are approximately 20 sites. The majority of sites are distributed on the northern and eastern sides of the dam. Use is considered high (relative to the overall use in the Emigrant) and estimated at 3.30 % of the total overnight use for the Emigrant. With the existing number of sites, the few groups allowed per night, and the maximum stay limit of one night, there should be opportunities for solitude.

Firewood availability condition was not specifically measured in 1998. Data did indicate that 16 of the 21 sites had evidence of fire use. It is unknown if the firewood availability standard is being met in this OC.

In the 1998 Emigrant Wilderness Management Plan EIS stated Bear Lake was beginning to exceed standards for campsite condition and meeting those for stock holding condition. Monitoring inventory from 1997 was inconclusive as no rating was assigned. However, 5 of

21 sites were recommended for removal and restoration. It is unknown if the campsite condition standard is being met in this OC. Data also indicated that one site had evidence of stock use; however, no measure on the stock holding condition was provided. It is unknown if the standard is being met in this OC.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Access is be on Primary Trail 20E14 (Burst Rock Trail) to Primary Trail 20E16 (Crabtree Trail) to an un-named historic way. The primary trail meets the OC standards.

Upper South Fork Stanislaus River Watershed

Cooper Meadow

Cooper Meadow was monitored in 1997. The lake is in OC III where opportunities for solitude should be moderate to outstanding. Four groups per night are allowed at any one time in Cooper Meadow. The 1997 monitoring data indicated there were approximately six established sites and the potential for at least two additional sites. Use is considered moderate and estimated at 1.0% of the total overnight use for the Emigrant. The moderate number of groups in relation to the number of campsites reduces the opportunity for solitude.

The firewood availability condition was not specifically measured in 1997. However, of the six sites that were inventoried, three sites had evidence of fire use. It is unknown if the firewood availability standard is being met in this OC.

In the 1998 Emigrant Wilderness Management Plan EIS, no campsite or stocking holding condition rating was assigned. Monitoring inventory from 1997 indicated over 50% of the sites inventoried were within condition class I and II. The campsite condition standard is being met in this OC. Data did not measure stock holding area condition; however, it did indicate that stock use was present in two sites. It is unknown whether the stock holding condition standard is being met.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Access is on Primary Trail 20E15 to Historic Way Trail 20E15. The trails meet the OC standards.

Whitesides Meadow

Inventory and monitoring was conducted in 1997. The meadow is in OC III where opportunities for solitude should be moderate to outstanding. Five groups per night are allowed at any one time in Whitesides Meadow. Inventory indicates there are 14 sites. Six sites, located on the southeastern lakeshore, appear to be in close proximity to each other. The remaining eight are distributed evenly around the southeast and northern lakeshore. Use is considered moderate and estimated at 1.4% of the total overnight use for the Emigrant. The opportunity for solitude would be dependent on where groups camp. Given the adequate number of sites, opportunities for solitude should be attainable.

It is unknown if the firewood availability standard is being met in this OC. However, monitoring inventory indicates 12 of 14 sites had evidence of fire use.

In the 1998 Emigrant Wilderness Management Plan EIS, stated Whitesides meets the standards for a campsite condition and stocking holding condition. Over half of the sites are in condition classes I and II and less than half are in condition classes III and IV. The campsite condition standard in this OC is being met. Stock area holding condition was not specifically measured in 1997: however, 3 of 14 sites showed evidence of stock use. It is unknown whether the stock holding condition standard is being met.

Regarding water developments, the presence of the dam and the existing degree of human influences did not preclude the area from being designated Wilderness.

Access to the dam site is on Primary Trail 20E14 (Burst Rock Trail). This well-maintained trail meets the OC standards.

3.2.4. Effects to Wilderness Character

The wilderness character of the Emigrant is comprised of several inter-related elements. Because of this connectivity, it is necessary to assess the effects an action may have on the following:

1. The biological and physical processes (natural processes)
2. The biological and physical resources (actual resource impacts)
3. The wilderness experience and the opportunity for solitude
4. The recreational experience

Ten management components have been used in this analysis to evaluate the overall effect the alternatives would have to the Emigrant Wilderness¹. This section utilizes four indicators (of 10 total) which quantify the "degree of human influences", "the imprint of humans," and "the opportunity for solitude" to determine the effect of the alternatives to the character of the Emigrant Wilderness:

- Crowding²
- Campsite and stock holding area condition
- Campfire wood and campfires
- Trails

To determine the effects of the alternatives to the Wilderness, the determination made is whether the action allows each affected area to retain its assigned OC or whether it moves the affected area outside of its assigned OC. Whether or not an action moves the affected area closer to the desired condition of a more pristine wilderness has been addressed in the "Minimum Necessary for the Administration of Wilderness" evaluation found in the project file.

¹ Please refer to the recreation and visuals, social and economic, soil, water, & riparian, wildlife, fisheries, and heritage sections for information and effects on the other interrelated components of the Emigrant Wilderness such as crowding (recreational experience), stream condition, water developments, wildlife habituation, facilities, structures and signs, fisheries management, and heritage resources.

² In this section, crowding is being used to determine the opportunity for solitude and is not being used to evaluate the effects to the recreational experience.

The cumulative effects area for Wilderness is grouped by the six sub-watersheds where the dams are located: East Fork Cherry Creek, North Fork Cherry Creek, Middle Fork Cherry Creek, West Fork Cherry Creek, Lily Creek, and Upper South Fork Stanislaus River. Past projects considered are from 1993 to 2003 and include trail maintenance and reconstruction, grazing allotment authorizations, grazing allotment and recreational stock fences, past dam inspection and maintenance occurrences, and fish stocking. Reasonably foreseeable future actions considered are from 2003 to 2013 and include trail reconstruction and re-routes, grazing, and fish stocking activities.

3.2.4.1. ALTERNATIVE 1 – PROPOSED ACTION

3.2.4.1.1. Direct and Indirect Effects

East Fork Cherry Creek Watershed

Snow Lake

To restore the Snow Lake dams, it is estimated three 7-day trips (2 days of travel and 5 days of actual work) would be needed. Each trip would be comprised of 4 people and 11 stock animals. A total of 21 days in the Emigrant Wilderness would be required¹. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a “moderate to outstanding” degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. This effect would be to hikers, backpackers, and stock users visiting the lake during the day, or as they travel through to another destination. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate destinations and trip dates. There would be no indirect effect from dam repair and annual maintenance actions to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of three groups allowed per night at Snow Lake. The work group would be allocated one of the three available camping permits for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites and could select a site (of the 16 total) that is the most remote and offers the most visual screening.

Data from 1997 indicated stock use occurred in at least three sites and that suitable sites exist for stock. However, no stock holding condition was assigned to Snow Lake. There would be no direct effect from stock use, as no stock would be held within the 300-foot project perimeter. The indirect effect of holding stock would be minimal, as suitable sites would be pre-selected by the Forest Service and minimum impact techniques (Leave No Trace) would be used. Monitoring would occur after each trip to further evaluate the impact from stock. With these mitigation measures, the condition class would be maintained.

The firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Work groups would be prohibited from using campfires and only pre-selected, hardened sites would be utilized.

The Snow Lake dams are evidence of human influence and development within an OC III Wilderness. The degree to which visitors view the dams as substantially unnoticeable, or are affected by the physical presence of the dams, has not been measured. When sought,

¹ For each dam, the time estimated to complete work is based on the worst-case scenario of several trips being needed to transport volunteers and materials in to each site.

the dams are noticeable and can be easily accessed from the trail system. The presence and maintenance of the dams would diminish the Wilderness experience for some visitors. Other visitors may be unaware the structures are present. In addition, work crew activities would reduce, by one site, the ability for visitors to be allocated an overnight permit for 18 days. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

The trail system to Snow Lake is in good condition. Direct effects (compaction and soil erosion) from stock use would be minimal, as there is no need for stock to leave the trail system or be within the 300-foot perimeter of the project (materials could be hand-delivered to each work site). Environmental Impact Statement. On file Although a minimal number of work trips are anticipated (3), indirectly, the creation of social trails from workers traveling to and from the dam sites is likely. The social trails may be in existence for several years or until work is complete and the trails rehabilitated. Annual maintenance by one person should not reduce the effectiveness of trail rehabilitation. In the long term, minimal effects are anticipated and the trail system would continue to meet the standards for this OC. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Bigelow Lake

To restore the Bigelow Lake dams, it is estimated two 7-day trips (2 days of travel and 5 days of actual work) would be needed. Trip 1 would be comprised of 4 people and 14 stock animals and Trip 2 would be 4 people and 13 stock animals. A total of 14 days in the Emigrant Wilderness would be required for restoration purposes. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a "high to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. This effect would be to hikers, backpackers, and stock users visiting the lake during the day, or as they travel through to another destination. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate destinations and trip dates. There would be no indirect effect from dam repair and annual maintenance actions to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of two groups allowed per night at Bigelow Lake. The work group would be allocated one of the two available camping permits for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites and could select a site (of the eight total) that is the most remote and offers the most visual screening.

Bigelow Lake meet the standards for stock holding condition and 2002 field notes indicate stock use is evident in three of the eight sites. There would be no direct effect from stock use, as no stock would be held within the 300-foot project perimeter. The indirect effect of holding 14 stock animals could include further vegetation loss and site degradation; however, this effect would be minimized by the low number of trips required, the pre-selection of suitable sites by the Forest Service, and the use of minimum impact techniques (Leave No Trace). Monitoring would occur after each trip to further evaluate the impact from stock. With these mitigation measures, the condition class would be maintained.

The firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Work groups would be prohibited from using campfires and only pre-selected, hardened sites would be utilized.

The Bigelow Lake dams are evidence of human influence and development within an OC II Wilderness. The degree to which visitors view the dams as substantially unnoticeable (In relation to the Wilderness Act) or are affected by the physical presence of the dams, has not been measured. When sought, the dams are noticeable and can be easily accessed from the trail system. Repair and maintenance would keep the dam noticeable, although this activity on a historic dam eligible for the National Register may improve some visitors Wilderness experience because they appreciate the role history plays in the purpose of Wilderness. The presence and maintenance of the dams would diminish the Wilderness experience for other visitors. Some visitors may be unaware the structures are present. In addition, work crew activities would reduce, by one site, the ability for visitors to be allocated an overnight permit for 12 days. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

A direct compaction and soil erosion effect to the primary trail system from stock use would be minimal as stock would not be within the 300-foot perimeter of the project for long periods and materials could be hand-delivered to each work site. Although it is estimated that two work trips would be required for dam restoration, a direct effect to trails would be the creation of social trails from workers traveling to and from the dam sites. The social trails may be in existence for several years or until reconstruction is complete and the trails rehabilitated. If work is conducted during wet periods, there is the potential for an indirect effect on the steep sections of the secondary (low use) trails. Soil damage and accelerated erosion from the number of stock using the travel way may occur. Annual maintenance by one person should not reduce the effectiveness of trail rehabilitation. In the long-term, minimal effects are anticipated and the trail system would continue to meet the standards for this OC. Refer to Botany at Section 3.9 for detailed information on effects to vegetation.

Horse Meadow

The Horse Meadow dams would not be maintained and gradual deterioration would occur. Since there would be no need for work groups to restore or maintain the dams in this alternative, the opportunity for a "moderate to outstanding" degree of solitude would be unchanged.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Potential direct and indirect effects in terms of vegetation loss and compaction to the primary trail would not occur. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Alternative 1 would allow for the deterioration of this human development within an OC III Wilderness, and in doing so, move the Wilderness slightly (insignificantly) towards the desired objective of a more pristine condition. The term insignificant is used because other evidence of human developments would remain in Horse Meadow, such as the snowtel site, a drift fence, and remnants of a cabin. The Horse Meadow dam is not visible from the primary trail system or from the frequently used campsites. No maintenance and no reconstruction of the dam may improve some visitors Wilderness experience and satisfy their need for minimal signs of human influences. However, the fact that portions of the dam would remain physically present for 500-1,000 years (Wisehart, 2003) may diminish the Wilderness experience for some visitors. Other visitors may be unaware the structure is "unnatural" or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Huckleberry Lake

The Huckleberry Lake dams would be restored and maintained in this alternative. It is estimated that one 7-day trip (2 days of travel and 5 days of actual work) would be needed. The trip would be comprised of four people and nine stock animals. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a "moderate to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. This effect would be to hikers, backpackers, and stock users visiting the lake during the day, or as they travel through to another destination. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate destinations and trip dates. There would be no indirect effect from dam repair and annual maintenance actions to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of eight groups allowed per night at Huckleberry Lake. The work group would be allocated one of the eight available camping permits for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites and could select a site (of the 41 total) that is remote and offers the most visual screening.

Data reviewed did not indicate what percentage of sites was suitable for stock. Based on meeting the standards for stock holding condition, there should be minimal indirect effects from holding and using stock for the project. This effect would be further reduced, as sites would be pre-selected for suitability by the Forest Service and minimum impact techniques (Leave No Trace) would be used. There would be minimal to no direct effect from stock use, as no stock would be held within the 300-foot project perimeter (materials could be hand-delivered to each site). Monitoring would occur after each trip to further evaluate the impact from stock. With these mitigation measures, the condition class would be maintained.

The firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Work groups would be subject to the same fire use regulations as other visitors and only pre-selected, hardened sites appropriate that group size would be utilized.

The Huckleberry Lake dams are evidence of human influence and development within an OC III Wilderness. The degree to which visitors view the dams as substantially unnoticeable (in the context of the Wilderness Act), or are affected by the physical presence of the dams, has not been measured. When sought, the dams are noticeable and can be accessed from the trail system. The presence and maintenance of the dams would diminish the Wilderness experience for some visitors. Other visitors may be unaware the structures are present. In addition, work crew activities would reduce, by one site, the ability for visitors to be allocated an overnight permit for six days. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

The trail system to Huckleberry Lake is in good condition. Direct trail effects, such as compaction and erosion from stock use would be minimal, as stock may leave the trail system or be within the 300-foot perimeter of the project (to deliver materials) for short periods. In addition, materials could be hand-delivered to each site. Although a minimal number of work trips is anticipated (1), the creation of social trails from workers traveling to and from the dam sites is likely. This effect would be reduced or eliminated when these

trails are rehabilitated. Annual maintenance by one person should not reduce the effectiveness of trail rehabilitation. In the long term, minimal effects are anticipated and the trail system would continue to meet the standards for OC III. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

North Fork Cherry Creek Watershed

High Emigrant Lake

To restore High Emigrant Lake dam, it is estimated two 7-day trips (2 days of travel and 5 days of actual work) for reconstruction purposes would be needed. Each trip would be comprised of 5 people and 13 stock animals for a total of 14 days in the Emigrant Wilderness. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a "high to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. This effect would be to hikers, backpackers, and stock users visiting the lake during the day, or as they travel through to another destination. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate routes and trip dates. There would be no indirect effect from dam repair and annual maintenance actions to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of one group allowed per night at High Emigrant Lake. The work group would be allocated the only available camping permit for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites (of the seven total) and could select a site that is remote and offers the most visual screening.

Data reviewed did not indicate what percentage of sites was suitable for stock. Based on a stock holding condition rating of I, holding stock for work purposes would have to be closely monitored, as resource damage (an indirect effect) could occur if the sites selected are not durable enough to withstand 15 animals for a 7 days. This indirect effect would be minimized by Forest Service pre-selection of suitable sites and the use of minimum impact techniques (Leave No Trace). There would be minimal direct effects from stock use, as no stock would be held within the 300-foot project perimeter and the time needed to deliver materials to each work site would be of short duration. Indirectly and in the short term, the stock holding rating of I could increase if selection and monitoring is inadequate. The impact may become long-term if site rehabilitation is unsuccessful at this elevation.

The firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Work groups would be subject to the same fire use restriction (no campfires are permitted) as other visitors and only pre-selected, hardened sites appropriate for that group size would be utilized.

The High Emigrant Lake dam is evidence of human influence and development within an OC II Wilderness. The degree to which visitors view the dams as substantially unnoticeable (in the context of the Wilderness Act), or are affected by the physical presence of the dam, has not been measured. When sought, the dam is noticeable and can be easily accessed from the trail system. The presence and maintenance of the dam would diminish the Wilderness experience for some visitors. Other visitors may be unaware the structures are present. In addition, work crew activities would make the area inaccessible (for 12 nights) to visitors seeking an overnight Wilderness experience at this lake since only one group per

night is allowed. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

The primary trail system to High Emigrant Lake is in good condition. There would be no direct compaction and erosion effects because the trail ends outside of the project area boundary. The indirect compaction and erosion effects of using the designated trail system should be minimal and within the standards for an OC II. Indirect effects, from stock using the undesignated route from Emigrant Meadow Lake to the dam sites, should be minimal since stock would have to utilize the undesignated route twice to deliver materials. In addition, materials could be hand-delivered to the work site. Although a minimal number of work trips are anticipated (2), the creation of social trails from workers traveling to and from the dam sites is likely. At this elevation, adequate rehabilitation of the trail is unlikely. Monitoring may find that the undesignated user trail is evolving into a higher class of trail. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Emigrant Meadow Lake

The Emigrant Meadow Lake dam would be restored and maintained in this alternative. Because the dam is considered to be in fairly good condition, it is estimated one 3-day trip (2 days of travel and 1 day of actual work) would be needed. The trip would be comprised of two people and four stock animals for a total of three days in the Emigrant Wilderness. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a "high to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. This effect would be to hikers, backpackers, and stock users visiting the lake during the day, or as they travel through to another destination. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate routes and trip dates. There would be no indirect effect of repair and annual maintenance to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of one group allowed per night at Emigrant Meadow Lake. The work group would be allocated the only available camping permit for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites (of the 10 total) and could select a site that is the most remote and has the most visual screening.

Data reviewed did not indicate what percentage of sites was suitable for stock. There would be minimal direct effects from stock use, as no stock would be held within the 300-foot project perimeter, and the time needed to deliver materials on-site would be of short duration. In addition, materials could be hand-delivered to each work site. The indirect effect of holding stock would be minimal, as suitable sites would be pre-selected by the Forest Service and minimum impact techniques (Leave No Trace) would be used. Monitoring would occur after each trip to evaluate further the impact from stock. With these mitigation measures, the condition class would be maintained. Although there is no assigned stock holding condition rating, it is unlikely the rating would be exceeded.

The firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Work groups would be subject to the same fire use restriction (no campfires are permitted) as other visitors and only pre-selected, hardened sites appropriate for that group size would be utilized.

The Emigrant Meadow Lake dam is evidence of human influence and development within an OC II Wilderness. The degree to which visitors view the dams as substantially unnoticeable (in the context of the Wilderness Act), or are affected by the physical presence of the dam, has not been measured. When sought, the dam is noticeable and can be easily accessed from the trail system. Repair and maintenance would keep the dam noticeable, although this activity on a historic dam eligible for the National Register may improve some visitors Wilderness experience because they appreciate the role history plays in the purpose of Wilderness. The presence and maintenance of the dam would diminish the Wilderness experience for other visitors. Some visitors may be unaware the structures are present. In addition, work crew activities would make the area inaccessible (a 2 day period) to visitors seeking an overnight Wilderness experience at this lake since only one group per night is allowed. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

The primary trail system to Emigrant Meadow Lake is in good condition. There would be minimal direct compaction effects from using stock to access the dam site because of the minimal number of trips. In addition, materials could be hand-delivered to each work site. The trail system should continue to meet the OC standards. The estimated number of work trips required (1) and the minimal duration of project would result in no measurable direct and indirect effects to the trail system. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Middle Emigrant Lake

The Middle Emigrant Lake dam would be repaired and maintained in this alternative. It is estimated two 7-day trips (2 days of travel and 5 days of actual work) would be needed. Each trip would be comprised of 4 people and 10 stock animals for a total of 14 days in the Emigrant Wilderness. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a "high to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. This effect would be to hikers and stock users visiting the lake during the day, or as they travel through to another destination. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate routes and trip dates. There would be no indirect effect from dam repair and annual maintenance activities to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of one group allowed per night at Middle Emigrant Lake. The work group would be allocated the only available camping permit for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites (of the six total) and could select a site that is the most remote and has the most visual screening.

Data reviewed did not indicate what percentage of sites was suitable for stock. There would be minimal direct effects from stock use, as no stock would be held within the 300-foot project perimeter for long periods. Based on a stock holding condition rating of II, holding stock for work purposes (outside of the 300 foot project perimeter), would have to be closely monitored, as resource damage (an indirect effect) could occur if the sites selected are not durable enough to withstand 10 animals for 7 days. This indirect effect would be minimized because suitable sites would be pre-selected by the Forest Service and minimum impact techniques (Leave No Trace) would be employed. In the short-term, the stock holding rating

of II could increase if site selection and monitoring is inadequate. The impact may become long-term if site rehabilitation is unsuccessful at this elevation.

The firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Work groups would be subject to the same fire use restriction (no campfires are permitted) as other visitors and only pre-selected, hardened sites appropriate for that group size would be utilized.

The Middle Emigrant Lake dam is evidence of human influence and development within an OC II Wilderness. The degree to which visitors view the dams as substantially unnoticeable (in relation to the Wilderness Act), or are affected by the physical presence of the dam, has not been measured. When sought, the dams are noticeable and can be easily accessed by following the lakeshore. The presence and maintenance of the dam would diminish the Wilderness experience for some visitors. Other visitors may be unaware the structures are present. In addition, work crew activities would make the area inaccessible (for 12 nights) to visitors seeking an overnight Wilderness experience at this lake since only one group per night is allowed. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Indirect effects to the primary trails (21E11 to Lunch Meadow) would be minimal as the trails are in good condition and there would be only two planned trips. The low number of trips needed would minimize the effects to the secondary trail system (21E05). There may be a direct and indirect compaction effect to the undesignated use route (west side of the lake) from stock and workers accessing the dam site repeatedly. Given the trail provides the only access to the dam site, rehabilitating the trail may be ineffective. Monitoring results may point to the trail degrading into a higher class. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Emigrant Lake

Emigrant Lake dam would be restored and maintained in this alternative. Because it is in good condition overall, it is estimated two 7-day trips (2 days of travel and 5 days of actual work) would be needed. Each trip would be comprised of five people and six stock animals for a total of 14 days in the Emigrant Wilderness. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a "moderate to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. Although the dam is removed from popular campsites, the effect would be to visitors who could hear the noise from their established campsites or while exploring the lake perimeter. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate routes and trip dates. There would be no indirect effect of repair and annual maintenance to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of seven groups allowed per night at Emigrant Lake. The work group would be allocated one of the seven available camping permits for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites (of the nine total) and could select a site that is the most remote and has the most visual screening.

Emigrant Lake is beginning to exceed standards for stock holding condition and the most recent inventory indicated three sites are available. Although it is unknown what the current

stock holding condition rating is, there should be minimal indirect effects since suitable sites would be selected by the Forest Service and minimum impact techniques (Leave No Trace) would be used. There would be minimal direct effects from stock use, as no stock would be held within the 300-foot project perimeter for long periods of time. However, stock may be present for short periods of time to deliver materials (materials could be hand-delivered on site as well). Monitoring would occur after each trip to further evaluate the impact from stock. The condition class would be maintained.

Although the firewood availability standard for this OC would not be positively or negatively affected by the alternative (no campfires would be permitted for work groups), the standard may continue to be exceeded by the public.

The Emigrant Lake dam is evidence of human influence and development within an OC III Wilderness. The degree to which visitors view the dams as substantially unnoticeable (in the context of the Wilderness Act), or are affected by the physical presence of the dam, has not been measured. The dam is difficult to find and not located close to popular campsites. However, when sought, the dam is apparent and can be accessed by following the lakeshore. Repair and maintenance would keep the dam noticeable, although this activity on a historic dam eligible for the National Register may improve some visitors Wilderness experience because they appreciate the role history plays in the purpose of Wilderness. The presence and maintenance of the dams would diminish the Wilderness experience for other visitors. Some visitors may be unaware the structures are present. In addition, work crew activities would reduce, by one site, the ability for visitors to be allocated an overnight permit for 12 days. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

The majority of access would be on primary trails. There would be no direct compaction and soil erosion effect from stock or foot use (the trails end before accessing the dam sites) and the indirect effects to primary trails would be minimal as the trails are in good condition and the estimated number of trips is low. Direct access to the dam sites would be on an undesignated route. The low number of trips needed for reconstruction (2) should minimize the compaction and erosion effects from stock use to the undesignated route. There may be a direct effect of social trails caused by workers accessing the dam site repeatedly. However, given the current OC of III and the low number of trips, it is unlikely the overall trail use would degrade the OC. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Cow Meadow Lake

The Cow Meadow Lake dams would be completely reconstructed and maintained in this alternative. It is estimated three 7-day trips (2 days of travel and 5 days of actual work per trip) for reconstruction purposes would be needed. Each trip would be comprised of 4 people and 9 stock animals for a total of 21 days in the Emigrant Wilderness. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam reconstruction, the opportunity for a "moderate to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. This effect would be to hikers, backpackers, and stock users visiting the lake during the day, and to groups traveling through to another destination. This effect would be reduced because the dam site is not located along the primary trail or by popular campsites. In addition, applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by

allowing visitors to select alternate destinations and trip dates. There would be no indirect effect of reconstruction and annual maintenance to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of four groups allowed per night at Cow Meadow Lake. The work group would be allocated one of the available camping permits for each day of work and for the duration of each trip. The opportunity for solitude, which is reduced at Cow Meadow Lake due to the lack of sites (there are five available sites), would continue to be marginal. However, the effect would be reduced since the Forest Service would pre-select suitable sites and could select a site that is the most remote and offers the most visual screening.

Cow Meadow Lake has not been assigned a stock holding condition rating. There would be minimal direct effects from stock use, as no stock would be held within the 300-foot project perimeter. Stock use to deliver materials on-site would be of short duration. Indirect impacts to vegetation and trees would be reduced because the drift fence present at the lake is available to disperse the impact of stock by offering an unconfined (but managed) area for grazing and overnight holding. A suitable site would still need to be selected for temporarily holding stock. Due to the number of trips and number of stock being used, the activities would have to be closely monitored and minimum impact techniques used. There could be loss of vegetation if the sites selected are not durable enough to withstand three trips of nine animals for 7 days. This indirect effect would be reduced since suitable sites would be pre-selected by the Forest Service. Monitoring would occur after each trip to further evaluate the impact from stock. With monitoring, the condition class would be maintained?.

Firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Work groups would be subject to the same fire use restrictions as other visitors and only pre-selected, hardened sites appropriate for that group size would be utilized.

The main Cow Meadow Lake dam is in disrepair and has deteriorated a great deal. However, the dams are evidence of human interference and development within an OC III Wilderness. The degree to which visitors view the dams as substantially unnoticeable (in the context of the Wilderness Act), or are affected by the physical presence of the dam, has not been measured. Although the dams are not easily located from the main trail, reconstruction would make the dams more noticeable. The presence and maintenance of the dams would diminish the Wilderness experience for some visitors. Other visitors may be unaware the structures are present. In addition, work crew activities would reduce, by one site, the ability for visitors to be allocated an overnight permit for 18 days. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Trail access would be on the well-maintained Primary Trail 20E17 until Cow Meadow Lake is reached. There would be no direct effects and minimal indirect effects to the trail system, as the trail does not access the dam sites. To access the dam site, an undesignated Use Route #21E21, which follows the north side of the lake, would be followed. This route is faint, receives little use, and passes through riparian vegetation and habitat. To mitigate the loss of vegetation and compaction of workers and stock to this undesignated route, a route located on durable soils and vegetation would be flagged before each trip. This action would minimize the direct and indirect effects to soils and vegetation and prevent the trail from degrading into a higher class. There would be minimal direct effects from stock use, as no stock would be held within the 300-foot project perimeter for long periods. Because of the number and duration of work trips needed (3), trail rehabilitation may be needed to

reduce and/or eliminate the direct effect of social trails around the dam sites. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Middle Fork Cherry Creek Watershed

Red Can Lake

Red Can Lake dam would not be maintained in this alternative and gradual deterioration would occur. Since there is no repair or maintenance needed at Red Can dam at this time, the opportunity for a "high to outstanding" degree of solitude would continue as it is now.

The firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Potential direct and indirect effects in terms of vegetation loss and compaction to Historic Way 20E18 and the un-designated cross-country routes would not occur. Refer to the Botany at Section 3.3 for detailed information on effects to vegetation.

Alternative 1 would allow for the deterioration of this human development within an OC II Wilderness, moving the Wilderness slightly towards the desired objective of a more pristine condition. The Red Can Lake dam is not readily visible from the trail system or from the seven established campsites. No maintenance and no reconstruction of the dam may improve some visitors Wilderness experience and satisfy their need for minimal signs of human influences. However, the fact that the dam would remain physically present for up to 10 years (Wisehart, 2003) may diminish the Wilderness experience for some visitors. Conversely, allowing a historic feature that is eligible for the National Register of Historic Places to disintegrate may detract from other visitor's Wilderness experience. Finally, other visitors may be unaware the structure is "unnatural" or present. Refer to the Visuals, Section 3.9 of this document for the effects of these dams to the visual resource.

Leighton Lake

Leighton Lake would be restored and maintained in this alternative. It is estimated that three 7-day trips (2 days of travel and 5 days of actual work) would be needed. Each trip would be comprised of 4 people and 10 stock animals for a total of 21 days in the Emigrant Wilderness. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a "moderate to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. Visitors would likely observe the work groups because the dam site is located close to a lakeshore trail. This effect would be to hikers and stock users visiting the lake during the day, and to groups traveling through to another destination. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate routes and trip dates. There would be no indirect effect from dam repair and annual maintenance actions to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of three groups allowed per night at Leighton Lake. The work group would be allocated one of the available camping permits for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites (of the six total) and could select a site that is the most remote and has the most visual screening.

Data reviewed did not indicate what percentage of sites was suitable for stock. There would be minimal effects from stock use, as no stock would be held within the 300-foot project perimeter for long periods of time. The time needed to deliver materials would be of short-duration. In addition, materials could be hand-delivered to each work site. Based on a stock holding condition rating of III, it is likely sites exist that could hold stock. Holding stock for work purposes would have to be closely monitored, as resource damage (an indirect effect) could occur if the selected sites were not durable enough to withstand 3 trips of 10 animals for 7 days. This indirect effect would be minimized, as suitable sites would be pre-selected by the Forest Service and minimum impact techniques (Leave No Trace) would be used. Monitoring would occur after each trip to further evaluate the impact from stock. With monitoring, the condition class could be maintained.

Firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Work groups would be subject to the same fire use restriction as other visitors and only pre-selected, hardened sites appropriate for that group size would be utilized.

Leighton Lake dam is evidence of human influence and development in an OC III Wilderness. The degree to which visitors view the dams as substantially unnoticeable or are affected by the physical presence of the dam, has not been measured. Repair and maintenance would keep the dam noticeable, although this activity on a historic dam eligible for the National Register may improve some visitors Wilderness experience because they appreciate the role history plays in the purpose of Wilderness. The presence and maintenance of the dam would diminish the Wilderness experience for some visitors. Other visitors may be unaware the structures are present. In addition, work crew activities would reduce, by one site, the ability for visitors to be allocated an overnight permit for 18 days. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

There would be a minimal indirect effect to primary trails, as the trails are in good condition. There would be no direct effect since the trails do not access the project site. Historic Way 20E26 and an undesignated route (no assigned number) would be used to access the dam sites. There may be vegetation loss and compaction to the undesignated use route (west side of the lake) from stock and workers accessing the dam sites repeatedly. Applying mitigation, which would locate and flag a route on durable soils and vegetation, would reduce this effect. Rehabilitation would be accomplished following completion of the reconstruction activities. However, monitoring results may point to these trails degrading into a higher class of trail. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Yellowhammer Lake

Yellowhammer Lake dam would not be maintained and deterioration, which is well underway, would continue. Since there would be no need for work groups to restore or maintain the dams in this alternative, the opportunity for a "high to outstanding" degree of solitude would be greater than if the dams were restored.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Potential direct and indirect effects in terms of vegetation loss and compaction to Historic Way 20E18 would not occur. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Alternative 1 would allow for the continued deterioration of this human development within an OC II Wilderness, moving the Wilderness slightly towards the desired objective of a more pristine condition. The Yellowhammer Lake dam is not readily visible from the 10 established campsites and the trail system. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, even though the dam is in disrepair, remnants would be physically present for up to 25 years before completely disintegrating (Wisehart, 2003). This may diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure is "unnatural" or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

West Fork Cherry Creek Watershed

Long Lake

To restore the Long Lake dams, it is estimated that one 7-day trip (2 days of travel and 5 days of actual work) would be needed. The trip would be comprised of 4 people and 10 stock animals for a total of 7 days in the Emigrant Wilderness. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a "high to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. Visitors would likely observe the work groups because the dam sites are located in close proximity to lakeshore trails. This effect would be to hikers and stock users visiting the lake during the day and to groups traveling through to another destination. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate routes and trip dates. There would be no indirect effect from dam repair and annual maintenance actions to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of four groups allowed per night at Long Lake. The work group would be allocated one of the available camping permits for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites (of the 22 total) and could select a site that is the most remote and has the most visual screening.

Long Lake meets the standards for stock holding condition and the inventory indicates three sites are receiving stock use. There would be minimal direct effect from stock use, as no stock would be held within the 300-foot project perimeter for long periods. If stock were used to deliver materials, the time required would be of short-duration. Holding stock for work purposes would have to be closely monitored because resource damage (an indirect effect) could occur if the sites selected were not durable enough to withstand one trip of 10 animals for 7 days. This indirect effect would be minimized, as suitable sites would be pre-selected by the Forest Service and minimum impact techniques (Leave No Trace) would be used. Monitoring would occur after each trip to further evaluate the impact from stock. With monitoring, the condition class could be maintained.

Firewood is scarce to unavailable around the established campsites. Applying the mitigation measure of allowing no campfires for the work groups at this lake would minimize additional impacts, but would not positively or negatively affect the firewood availability standard for the area. The area would likely continue being deficit unless other management actions are taken. The campsite condition standard, which is currently being exceeded, would continue to be exceeded. Project activities would not indirectly affect the standard (or further degrade

the resource) because only pre-selected, hardened sites appropriate for that group size would be utilized.

The Long Lake dams are evidence of human influence and development in an OC II Wilderness. The degree to which visitors view the dams as substantially unnoticeable (in context to the Wilderness Act), or are affected by the physical presence of the dams, has not been measured. Repair and maintenance would keep the dams noticeable, although this activity on a historic dam eligible for the National Register may improve some visitors Wilderness experience because they appreciate the role history plays in the purpose of Wilderness. The dams would continue to be visible from the trail system and would remain physically present for many years (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware the structures are present. In addition, work crew activities would reduce, by one site, the ability for visitors to be allocated an overnight permit for six nights. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

There would be minimal to no direct and indirect effects to primary trails from project activities. An undesignated use route would be used to access the dam sites. There would likely be a direct and indirect vegetation loss and compaction effect to this route from stock and workers accessing the dam sites repeatedly. Applying mitigation, which would locate and flag a route on durable soils and vegetation, would reduce this effect. However, the undesignated use route, which currently appears to be degrading into a well-established secondary trail, is likely to continue degrading into a higher class of trail. It is unknown if rehabilitation would be effective. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Lower Buck Lake

Lower Buck Lake dam would be restored and maintained in this alternative and it is estimated three 7-day trips (2 days of travel and 5 days of actual work per trip) would be needed. Each trip would be comprised of four people and six stock animals for a total of 21 days in the Emigrant Wilderness. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repairs, the opportunity for a "moderate to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site. This effect would be to hikers, backpackers, and stock users visiting the lake during the day, and to groups traveling through to another destination. This effect would be reduced because the dam site is located at least 100 yards from a secondary trail and is not close to most of the campsites. In addition, applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate destinations and trip dates. There would be no indirect effect from dam repair and annual maintenance actions to the opportunity for solitude, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of 10 groups allowed per night at Buck Lakes. The work group would be allocated one of the available camping permits for each day of work and for the duration of each trip. The opportunity for solitude, which is reduced at Buck Lakes due to the high number of groups permitted and a nominal number of sites (there are 19 available sites), would continue to be marginal. However, the effect would be reduced since the Forest Service would pre-select suitable sites and could select a site that is the most remote and has the most visual screening.

There would be minimal direct effects from stock use, as no stock would be held within the 300-foot project perimeter for long periods. Indirect impacts to vegetation, riparian, and trees would be reduced by the ability to use the drift fence that is present at the upper portion of the lake to disperse the impact of stock by offering an unconfined (but managed) area for grazing and overnight holding. There are suitable sites for temporary holding stock and they would be used. The indirect effect on these sites should be minimal, even with the number of trips and number of stock required, as suitable sites would be pre-selected by the Forest Service and minimum impact techniques (Leave No Trace) would be used. Monitoring would occur after each trip to further evaluate the impact from stock. Although there is no stock holding condition rating, degradation from the existing condition would not be expected to occur.

Firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Work groups would be subject to the same fire use restrictions as other visitors and only pre-selected, hardened sites appropriate for that group size would be utilized.

The Lower Buck Lake dam is in fairly good repair and is evidence of human influence and development within an OC III Wilderness. The degree to which visitors view the dams as substantially unnoticeable, or are affected by the physical presence of the dam, has not been measured. Although the dam is located at least 100 yards from a commonly used trail, repair (when needed) would keep the dam noticeable. Repair and maintenance would keep the dam noticeable, although this activity on a historic dam eligible for the National Register may improve some visitors Wilderness experience because they appreciate the role history plays in the purpose of Wilderness. The presence and maintenance of the dam would diminish the Wilderness experience for some visitors. Other visitors may be unaware the structures are present. In addition, work crew activities would reduce, by one site, the ability for visitors to be allocated an overnight permit for 18 days. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Indirect effects (vegetation loss and compaction) on primary and secondary trails would be minimal to non-existent as the trails are in good shape and are routinely maintained. Direct and indirect effects of using a cross-country route to access the dam site would include some compaction and vegetation loss. To mitigate this effect, a route that is located on durable soils and vegetation would be flagged before each trip. This action would reduce the direct and indirect effects to soils and vegetation and prevent the trail from degrading into a higher class. Because of the number and duration of the work trips needed, trail rehabilitation would be needed to reduce and/or eliminate the direct and indirect effect of social trails around the dam site. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Lily Creek Watershed

Y-Meadow Lake

Y-Meadow Lake dam would be restored and maintained in this alternative. It is estimated two 7-day trips (2 days of travel and 5 days of actual work per trip) would be needed. Each trip would be comprised of 4 people and 6 stock animals for a total of 14 days in the Emigrant Wilderness. Maintenance of the dams is estimated to require one person to make three trips per year. Stock may or may not be used for maintenance. During dam repair, the opportunity for a "moderate to outstanding" degree of solitude would be directly affected and diminished in the daytime by the noise and visibility of people working at the dam site.

This effect would be to hikers, backpackers, and stock users visiting the lake during the day, and to groups traveling through to another destination. Applying the mitigation measure of notifying visitors of pending work trips would reduce this effect by allowing visitors to select alternate destinations and trip dates. The indirect effect of both dam repair and annual maintenance actions to the opportunity for solitude would be minimal, as group size and stock required would be within the Emigrant Wilderness regulations. There is a maximum of three groups allowed per night at Y-Meadow Dam. The work group would be allocated one of the available camping permits for each day of work and for the duration of each trip. The opportunity for solitude would also be maintained since the Forest Service would pre-select suitable sites and could select a site (of the 20 total) that is the most remote and offers the most visual screening.

Y-Meadow has a stock holding condition rating of II and the inventory indicates at least one site is suitable for stock use. There would be minimal direct effects from stock use, as no stock would be held within the 300-foot project perimeter for long periods of time. Resource damage in the form of vegetation loss and tree damage (an indirect effect) would occur if the sites selected were not durable enough to withstand two trips of six animals for 7 days. This indirect effect would be minimized since suitable sites would be pre-selected by the Forest Service and minimum impact techniques (Leave No Trace) would be used. Monitoring would occur after each trip to further evaluate the impact from stock. With site selection and monitoring, the condition class be maintained.

Firewood is scarce to unavailable around the established campsites. Applying the mitigation measure of allowing no campfires for the work groups at this lake would minimize additional impacts, but would not positively or negatively affect the firewood availability standard for the area. The area would continue to be deficit unless other management actions are taken. The campsite condition standard would not be positively or negatively affected.

Y Meadow dam is evidence of human influence and development in an OC III Wilderness. The degree to which visitors view the dams as substantially unnoticeable (in the context of the Wilderness Act), or are affected by the physical presence of the dam, has not been measured. Repair and maintenance would keep the dam noticeable and the presence and maintenance of the dam would diminish the Wilderness experience for some visitors. Because of the size of the dam, it is unlikely that visitors would be unaware the structure is present. In addition, work crew activities would reduce, by one site, the ability for visitors to be allocated an overnight permit for 12 days. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

There would be minimal to no direct and indirect effects to the primary trail from project activities, as this trail is in good condition and receives routine maintenance. An un-named historic way would be used to access the dam site. There would likely be direct and indirect vegetation loss and compaction effect to this route from stock and workers accessing the dam sites repeatedly over the course of two trips. Applying mitigation, which would locate and flag the most durable route, would reduce this effect. However, the historic way may degrade into a higher class of trail. It is unknown if rehabilitation would be effective in this location. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Bear Lake

Bear Lake dam would not be maintained and gradual deterioration would occur. Since there would be no need for work groups to restore or maintain the dams in this alternative, the

opportunity for a "low to outstanding" degree of solitude would be significantly greater than if the dams were restored. This is because there is no need for the substantial amount of work groups and stock support needed to complete the work activities. (It was estimated dam reconstruction would require 10 trips and 45 days of use within the Emigrant Wilderness). No mitigation would be necessary.

The firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Potentially high amounts of vegetation loss and compaction effects to an un-named historic way would not occur. The effects would be much less than if the dam were maintained because there is no need for stock or workers to repeatedly access the dam site. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Alternative 1 would allow for the continued deterioration of this human development within an OC IV Wilderness, moving the Wilderness slightly towards the desired objective of a more pristine condition. The Bear Lake dam is readily visible from the trail system. No maintenance and no reconstruction of the dam may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dam would remain physically present for 200-500 years before completely disintegrating (Wisehart, 2003), diminishing the Wilderness experience for some visitors. Other visitors may be unaware the structure is "unnatural" or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Upper South Fork Stanislaus River Watershed

Cooper Meadow

Cooper Meadow dam would not be maintained and gradual deterioration would occur. Since there would be no need for work groups to restore or maintain the dams in this alternative, the opportunity for a "moderate to outstanding" degree of solitude would be greater than if the dams were restored. This is because there would be no need for work groups and stock support to complete repair or maintenance activities. It was estimated that dam reconstruction would require two trips and 14 days of use within the Emigrant Wilderness. No mitigation would be necessary.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Potential direct and indirect effects in terms of vegetation loss and compaction to Historic Way 20E15 would not occur. The effects would be less than if the dam had been maintained because there is no need for stock or workers to access the dam site repeatedly. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Alternative 1 would allow for the gradual deterioration of this human development within an OC III Wilderness, moving the Wilderness slightly towards the desired objective of a more pristine condition. The Cooper Meadow dam is readily visible from the trail system. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dam would be physically present and could persist for 200-500 years before disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure is "unnatural" or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Whitesides Meadow

The Whitesides Meadow dam would not be maintained and gradual deterioration would occur. Since there would be no need for work groups to restore or maintain the dams in this alternative, the opportunity for a “moderate to outstanding” degree of solitude would be greater than if the dams were restored. This is because there would be no need for work groups and stock support to complete repair or maintenance activities. It was estimated that dam reconstruction would require one trip, 15 stock animals, and 5 days of use within the Emigrant Wilderness. No mitigation would be necessary.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Potential direct and indirect effects in terms of vegetation loss and compaction to the primary trail would not occur. The effects would be less than if the dam had been maintained because there is no need for stock or workers to access the dam site. Refer to the Botany at Section 3.9 for detailed information on effects to vegetation.

Alternative 1 would allow for the gradual deterioration of this human development within an OC III Wilderness, moving the Wilderness slightly towards the desired objective of a more pristine condition. Whitesides Meadow dam is readily visible from the trail system and can be accessed from campsites. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dam would be physically present and could persist for 500 to 1,000 years before disintegrating (Wisehart, 2003). This may diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure is “unnatural” or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

3.2.4.1.2. Cumulative Effects

East Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Emigrant Wilderness in the East Fork Cherry Creek sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, fish stocking, both commercial and general recreation use (and the subsequent development of campsites and use areas), snowtel site maintenance and repair, and the installation and repair of fencing to minimize the impacts of recreational stock. Cumulatively, these actions have determined the OC for the East Fork Cherry Creek lakes and dams. Restoration of three of four structures, in addition to the continuation of the activities noted above, would provide for a continuous and higher degree of human influences in this sub-watershed than those sub-watersheds without dam structures. The sub-watershed would not likely move towards a more pristine condition. The effect is likely to persist for at least 10 years and into the foreseeable future. Because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The persistence of the dams in Wilderness would likely continue to diminish the wilderness experience for some visitors, while others would not be affected.

North Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the North Fork Cherry Creek sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, fish stocking, both commercial and general recreation use (and the subsequent development of campsites and use areas). Cumulatively, these actions have determined the OC for the North Fork Cherry Creek lakes and dams. A more pristine condition has been retained in the upper portion of the sub-watershed (than in the lower portion) and there would be less apparent effect from human influences in the upper portion of the sub-watershed. However, restoration of all dam structures, in addition to the continuation of the activities noted above, would result in a continuous and higher degree of human influences in this sub-watershed than if the structures were not present. The effect is likely to persist for at least 10 years and into the foreseeable future. Overall, the sub-watershed, would not likely continue moving towards a more pristine condition. Because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The persistence of the dams in Wilderness would likely continue to diminish the wilderness experience for some visitors, while others would not be affected.

Middle Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Middle Fork Cherry Creek sub-watershed. These include trail construction, trail reconstruction and maintenance in a small portion of the sub-watershed, dam maintenance and reconstruction, fish stocking, and both commercial and general recreation use (and the subsequent development of campsites and use areas). Cumulatively, these actions have determined the OC for the Middle Fork Cherry Creek lakes and dams. A more pristine condition has been retained and there would be less apparent effect from human influences in the Red Can Lake and Yellowhammer areas of the sub-watershed. The restoration of one dam structure (of three total), in addition to the continuation of the activities noted above, would provide for a reduced degree of human influence in this sub-watershed. The effect is likely to continue longer than the 10-year cumulative effects window. Whether the sub-watershed would move towards a more pristine condition is unknown. Although the presence of trails is minimal in the OC II areas, other factors such as the level of recreation use and potential fish stocking could preclude a Class I rating. Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The persistence of the one dam in this sub watershed would likely continue to diminish the wilderness experience for some visitors, while others would not be affected.

West Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, both commercial and general recreation use (and the subsequent development of campsites and use areas), drift fences to minimize the effects of stock use, and fish stocking. Cumulatively, these actions have determined the OC for the

West Fork Cherry Creek lakes/dams. There is a relatively high degree of human influence on this sub-watershed. Dam maintenance and reconstruction, when combined the continuation of the activities noted above, would continue the degree of human influence and the effect is likely to continue longer than the ten-year cumulative effects window. It is unlikely the sub-watershed would move towards a more pristine condition. Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The persistence of the dams in this sub watershed would likely (continue to) diminish the wilderness experience for some visitors while others would not be affected.

Lily Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Lily Creek sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, both commercial and general recreation use (and the subsequent development of campsites and use areas), and the Bell Meadow Bear Lake and Cooper grazing allotments. Cumulatively, these actions have determined the OC for the Lily Creek lakes/dams. There is a relatively high degree of human influence on this sub-watershed. Allowing for the deterioration of one dam structure, when combined the continuation of the activities noted above, would minimally lessen the degree of human influence. This effect is likely to continue longer than the 10-year cumulative effects window. When considered with the continuation of recreational use levels and grazing authorizations, it is unlikely the sub-watershed would move towards a more pristine condition (even with the deterioration of one dam). Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The persistence of the one dam in this sub watershed would likely continue to diminish the wilderness experience for some visitors while others would not be affected.

Upper South Fork Stanislaus River Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Upper South Fork Stanislaus River sub-watershed. These include trail reconstruction and maintenance in a portion of the sub-watershed, both commercial and general recreation use (and the subsequent development of campsites and use areas), and grazing authorizations in the Cooper Allotment. Cumulatively, these actions have determined the OC for this sub-watershed. There has been a moderate effect from human influences in this area. The deterioration of the dams would provide for a reduced degree of human influence in this sub-watershed. When considered with the continuation of recreational use levels and grazing authorizations, it is unlikely the sub-watershed would move towards a more pristine condition (even with the deterioration of both dams). The human influences effect is likely to continue longer than a 10-year window. Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The deterioration of both dams in this sub watershed would likely improve the wilderness experience for some visitors while others would not be affected.

3.2.4.1.3. Other Potential Effects

Refer to Soils, Watershed, Wildlife, Recreation, Visuals, Fisheries, Botany, and Socio-Economic Sections for the effects to other Wilderness processes and resources.

3.2.4.2. ALTERNATIVE 2 – NO ACTION

3.2.4.2.1. Direct and Indirect Effects

East Fork Cherry Creek Watershed

Snow Lake

Snow Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the existing condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

Alternative 2 would allow for the gradual deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their need for minimal signs of human influences. However, the dams would continue to be visible from the trail system, would be physically present, and could persist for 500 –1,000 years before completely disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was “un-natural” or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Bigelow Lake

Bigelow Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

Alternative 2 would allow for the gradual deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dams would continue to be visible from the trail system, would be physically present, and could persist for 500-1,000 years before completely disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was “un-natural” or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Horse Meadow

The direct and indirect effects of not repairing and maintaining Horse Meadow dam would be the same as in Alternative 1.

Huckleberry Lake

Huckleberry Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This alternative would allow for the gradual deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dams would continue to be visible from the trail system, would be physically present, and could persist for 200-500 years before disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was “un-natural” or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

North Fork Cherry Creek Watershed

High Emigrant Lake

High Emigrant Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This alternative would allow for the gradual deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dams would continue to be visible from the trail system, would be physically present, and could persist for 500-1,000 years before completely disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was “un-natural” or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Emigrant Meadow Lake

Emigrant Meadow Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This alternative would allow for the gradual deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dams would be physically present and could persist for 500-1,000 years before completely disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was "un-natural" or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Middle Emigrant Lake

Middle Emigrant Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This Alternative would allow for the gradual deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dams would be physically present and could persist for 500-1,000 years before completely disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was "un-natural" or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Emigrant Lake

Emigrant Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This alternative would allow for the gradual deterioration of one human development within Wilderness and move the Wilderness slightly towards the objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dams would be physically present and could persist between 500-1,000 years before completely disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure

was “un-natural” or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Cow Meadow Lake

Cow Meadow Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This alternative would allow for the gradual deterioration of one human development within Wilderness and move the Wilderness slightly towards the objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, even though the dams are in disrepair, remnants would be physically present and could persist for 500-1,000 years before completely disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was “un-natural” or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Middle Fork Cherry Creek Watershed

Red Can Lake

The direct and indirect effects of not repairing and maintaining Red Can dam would be the same as in Alternative 1.

Leighton Lake

Leighton Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This alternative would allow for the deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. The dam is visible from the lakeshore. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, even though the dams are in disrepair, remnants would be physically present and could persist for 200-500 years before completely disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was “un-natural” or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Yellowhammer Lake

The direct and indirect effects of not repairing and maintaining Yellowhammer Lake dam would be the same as in Alternative 1.

West Fork Cherry Creek Watershed

Long Lake

Long Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This alternative would allow for the deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. The dams are visible from the lakeshore. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dams would be physically present and could persist for 500-1,000 years before completely disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was "un-natural" or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Lower Buck Lake

Lower Buck Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This alternative would allow for the deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dam, which is in fairly good condition, would be physically present and could persist for 500-1,000 years before disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was "un-natural" or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Lily Creek Watershed

Y-Meadow Lake

Y Meadow Lake dam would not be repaired or maintained and gradual deterioration would occur. The opportunity for solitude would remain unchanged from the current condition.

Firewood availability, campsite condition, and stock holding standards for this OC would not be positively or negatively affected. Camping, trail use, and stock use would likely continue at its current rate and would not be positively or negatively affected.

This alternative would allow for the deterioration of one human development within Wilderness and move the Wilderness slightly towards the desired objective of a more pristine condition. No maintenance and no reconstruction of the dams may improve some visitors Wilderness experience and satisfy their desire for minimal signs of human influences. However, the dam, which is in fairly good condition and very visible, would be physically present and could persist for 500-1,000 years before disintegrating (Wisehart, 2003). This may continue to diminish the Wilderness experience for some visitors. Other visitors may be unaware that the structure was “un-natural” or present. Refer to the Visuals, Section 3.3 of this document for the effects of these dams to the visual resource.

Bear Lake

The direct and indirect effects of not repairing and maintaining Bear Lake dam would be the same as in Alternative 1.

Upper South Fork Stanislaus River Watershed

Cooper Meadow

The direct and indirect effects of not repairing and maintaining Cooper Meadow dam would be the same as in Alternative 1.

Whitesides Meadow

The direct and indirect effects of not repairing and maintaining Whitesides Meadow dam would be the same as in Alternative 1.

3.2.4.2.2. Cumulative Effects

East Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Emigrant Wilderness in the East Fork Cherry Creek sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, fish stocking, both commercial and general recreation use (and the subsequent development of campsites and use areas), snowtel site maintenance and repair, and the installation and repair of fencing to minimize the impacts of recreational stock. Cumulatively, these actions have determined the OC for the East Fork Cherry Creek lakes and dams. Allowing dam structures to deteriorate would reduce the degree of human influence. However, when considering the continuation of the activities noted above, the sub-watershed would continue to be affected by human influences, regardless of the removal of the four structures. The sub-watershed would not likely move towards a more pristine condition. The effect is likely to persist for at least 10 years and into the foreseeable future. Because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The conscious decision to not

maintain the dams in Wilderness would likely improve the wilderness experience for some visitors while others would not be affected.

North Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the North Fork Cherry Creek sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, fish stocking, both commercial and general recreation use (and the subsequent development of campsites and use areas). Cumulatively, these actions have determined the OC for the North Fork Cherry Creek lakes and dams. However, a more pristine condition has been retained (and there has been less apparent effect from human influences) in the upper portion of the sub-watershed. Allowing all dam structures to naturally deteriorate, while there is a continuation of the activities noted above, would result in a lesser degree of human influences in this sub-watershed than if the structures were present. However, the influences would persist and the effects would likely persist for at least 10 years and into the foreseeable future. The upper reaches of the sub-watershed may move towards a more pristine condition because of the low existing levels of recreational use, trails, and overall condition. It is unlikely the lower reaches of the sub-watershed would move closer to a more pristine OC as a result of non-maintenance of the dams. Because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The conscious decision to not manage the dams in Wilderness would likely improve the wilderness experience for some visitors while others would not be affected.

Middle Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Middle Fork Cherry Creek sub-watershed. These include trail construction, trail reconstruction and maintenance in a small portion of the sub-watershed, dam maintenance and reconstruction, fish stocking, and both commercial and general recreation use (and the subsequent development of campsites and use areas). Cumulatively, these actions have determined the OC for the Middle Fork Cherry Creek lakes and dams. A more pristine condition has been retained and there has been less apparent effect from human influences in the Red Can Lake and Yellowhammer areas of the sub-watershed. The deterioration of the dam structures, in addition to the continuation of the activities noted above, would provide for a reduced degree of human influence in this sub-watershed. The effect is likely to continue longer than the ten-year cumulative effects window. Whether the sub-watershed would move towards a more pristine condition is unknown. The present conditions found in Red Can and Yellowhammer would most likely be maintained. At Leighton Lake, other factors such as the levels of recreation use and potential fish stocking would not make a move towards a more pristine class.

Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. Allowing the dams to deteriorate in this sub-watershed would likely improve the wilderness experience for some visitors while others would not be affected.

West Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, both commercial and general recreation use (and the subsequent development of campsites and use areas), drift fences to minimize the effects of stock use, and fish stocking. Cumulatively, these actions have determined the OC for the West Fork Cherry Creek lakes/dams. There is a relatively high degree of human influence on this sub-watershed. Allowing the dams to deteriorate would reduce the degree of human influence. However, when considering the continuation of the activities noted above, the sub-watershed would continue to be affected by human influences, regardless of the removal of the structures. Dam maintenance and reconstruction, when combined the continuation of the activities noted above, would continue the degree of human influence and the effect is likely to continue longer than the ten-year cumulative effects period. It is unlikely the sub-watershed would move towards a more pristine condition.

Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The deterioration of the dams in this sub-watershed would likely improve the wilderness experience for some visitors while others would not be affected.

Lily Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Lily Creek sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, both commercial and general recreation use (and the subsequent development of campsites and use areas), and the Bell Meadow Bear Lake and Cooper grazing allotments. Cumulatively, these actions have determined the OC for the Lily Creek lakes/dams. There is a relatively high degree of human influence on this sub-watershed. Allowing for the deterioration of two dams, when combined the continuation of the activities noted above, would lessen the degree of human influence minimally and the effect is likely to continue longer than the ten-year cumulative effects window. Considering the recreational use levels and grazing authorizations, it is unlikely the sub-watershed would move more than minimally towards a more pristine condition (even with the deterioration of two dams).

Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The cessation of dams in this sub-watershed would likely improve the wilderness experience for some visitors while others would not be affected.

Upper South Fork Stanislaus River Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Upper South Fork Stanislaus River sub-watershed. These include trail reconstruction and maintenance in a portion of the sub-watershed, both commercial and general recreation use (and the subsequent development of campsites and use areas), and grazing

authorizations in the Cooper Allotment. Cumulatively, these actions have determined the OC for this sub-watershed. There has been a moderate effect from human influences in this area. The deterioration of the dams would provide for a reduced degree of human influence in this sub-watershed. When considered with the continuation of recreational use levels and grazing authorizations, it is unlikely the sub-watershed would move towards a more pristine condition (even with the deterioration of both dams). The human influences effect is likely to continue longer than the ten-year cumulative effects window.

Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The deterioration of both dams in this sub-watershed would likely improve the wilderness experience for some visitors while others would not be affected.

3.2.4.2.3. Other Potential Effects

Refer to Soils, Watershed, Wildlife, Recreation, Visuals, Fisheries, Botany, and Socio-Economic Sections for the effects to other Wilderness processes and resources.

3.2.4.3. ALTERNATIVE 3 – HERITAGE

3.2.4.3.1. Direct and Indirect Effects

East Fork Cherry Creek Watershed

Snow Lake

The direct and indirect effects of not repairing and maintaining Snow Lake dam would be the same as in Alternative 2.

Bigelow Lake

The direct and indirect effects of repairing and maintaining Bigelow Lake dam would be the same as in Alternative 1.

Horse Meadow

The direct and indirect effects of not repairing and maintaining Horse Meadow dam would be the same as in Alternative 1 and 2.

Huckleberry Lake

The direct and indirect effects of not repairing and maintaining Huckleberry Lake dam would be the same as in Alternative 2.

North Fork Cherry Creek Watershed

High Emigrant Lake

The direct and indirect effects of not repairing and maintaining High Emigrant Lake dam would be the same as in Alternative 2.

Emigrant Meadow Lake

The direct and indirect effects of repairing and maintaining Emigrant Meadow Lake dam would be the same as in Alternative 1.

Middle Emigrant Lake

The direct and indirect effects of not repairing and maintaining Middle Emigrant Lake dam would be the same as in Alternative 2.

Emigrant Lake

The direct and indirect effects of repairing and maintaining Emigrant Lake dam would be the same as in Alternative 1.

Cow Meadow Lake

The direct and indirect effects of not repairing and maintaining Cow Meadow Lake dam would be the same as in Alternative 2.

Middle Fork Cherry Creek Watershed*Red Can Lake*

Red Can Lake dam would be maintained in this alternative. Although the dam is currently in good condition, annual inspections and maintenance trips may occur. It is estimated one work trip (2 days of travel/actual work per trip) would be needed for maintenance purposes. The trip would likely be comprised of one person and stock may or may not be used. During maintenance trips, the opportunity for solitude would be minimally affected and minimally diminished in the daytime by the noise and visibility of someone working at the dam site. This short-term effect would be to hikers, backpackers, and stock users visiting the lake during the day, and to groups traveling through to another destination. There would be no indirect effect (from the annual maintenance actions) to the opportunity for solitude as the group size (number of people and stock) would be within the Emigrant Wilderness regulations. There is a maximum of two groups allowed per night at the lake. The worker would be allocated one of the available camping permits for the duration of each trip. The opportunity for solitude would continue to be high. In addition, the potential effect to solitude would be reduced since the Forest Service would pre-select suitable sites and could select a site that is the most remote has the most visual screening.

The firewood availability and campsite condition standards for this OC would not be positively or negatively affected. Any work group would be subject to the same fire use regulations as other visitors and only pre-selected, hardened sites (that are the appropriate size for the group) would be utilized. Given the short duration of the work trip and low number of stock projected, there should be a minimal indirect effect from stock if suitable sites are selected and low impact techniques are used.

Indirect effects (vegetation loss and compaction) on primary and secondary trails would be minimal to non-existent as the trails are in good shape and are routinely maintained. Potential vegetation loss and compaction effects to Historic Way 20E18 and the undesignated cross-country routes (from maintenance and reconstruction activities) are unlikely to occur from one annual trip. However, to mitigate the effect from workers and

stock use, a route that is located in durable soils and vegetation would be flagged in prior to each trip. This action would reduce the direct and indirect effects to soils and vegetation and prevent the trail from degrading into a higher class. Because of the short duration of the work trips needed, trail rehabilitation is likely not needed to reduce and/or eliminate the direct and indirect effect of social trails around the dam site. Please refer to Botany (Section 3.9) for detailed information on the effects to vegetation.

Alternative 3 would not move the Wilderness towards the desired objective of a more pristine condition. The degree to which visitors view the dams as substantially unnoticeable, or are affected by the physical presence of the dam, has not been measured. Although the dam is located away from the commonly used trails reconstruction and maintenance would keep the dam noticeable. Maintenance and reconstruction of the historic dams may improve some visitors Wilderness experience because they appreciate the role history plays in the purpose of Wilderness. The presence and maintenance of the dam would diminish the Wilderness experience for some visitors. Other visitors may never encounter the structure (please refer to Visuals at Section 3.3 of this document for the effects of the dam to the visual resource).

Leighton Lake

The direct and indirect effects of repairing and maintaining Leighton Lake dam would be the same as in Alternative 1.

Yellowhammer Lake

The direct and indirect effects of not repairing and maintaining Yellowhammer Lake dam would be the same as in Alternative 1 and 2.

West Fork Cherry Creek Watershed

Long Lake

The direct and indirect effects of repairing and maintaining Long Lake dam would be the same as in Alternative 1.

Lower Buck Lake

The direct and indirect effects of repairing and maintaining Lower Buck Lake dam would be the same as in Alternative 1.

Lily Creek Watershed

Y-Meadow Lake

The direct and indirect effects of not repairing and maintaining Y-Meadow Lake dam would be the same as in Alternative 2.

Bear Lake

The direct and indirect effects of not repairing and maintaining Bear Lake dam would be the same as in Alternative 1 and 2.

Upper South Fork Stanislaus River Watershed

Cooper Meadow

The direct and indirect effects of not repairing and maintaining Cooper Meadow dam would be the same as in Alternative 1 and 2.

Whitesides Meadow

The direct and indirect effects of not repairing and maintaining Whitesides Meadow dam would be the same as in Alternative 1 and 2.

3.2.4.3.2. Cumulative Effects

East Fork Cherry Creek

Human influences and actions from the past 10 years have shaped the current condition of the Emigrant Wilderness in the East Fork Cherry Creek sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, fish stocking, both commercial and general recreation use (and the subsequent development of campsites and use areas), snowtel site maintenance and repair, and the installation and repair of fencing to minimize the impacts of recreational stock. Cumulatively, these actions have determined the OC for the East Fork Cherry Creek lakes and dams. Allowing three of four dams to deteriorate would reduce the degree of human influence. However, when considering the continuation of the activities noted above, the sub-watershed would continue to be affected by human influences, regardless of the natural deterioration of the three structures. The sub-watershed, as a unit, would not likely move towards a more pristine condition. The effect is likely to persist for at least 10 years and into the foreseeable future.

Because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The conscious decision to not maintain three of the four dams in Wilderness would likely improve the wilderness experience for some visitors while others would not be affected.

North Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the North Fork Cherry Creek sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, fish stocking, both commercial and general recreation use (and the subsequent development of campsites and use areas). Cumulatively, these actions have determined the OC for the North Fork Cherry Creek lakes and dams. However, a more pristine condition has been retained (and there has been less apparent effect from human influences) in the upper portion of the sub-watershed. Allowing three of five dams to naturally deteriorate, while there is a continuation of the activities noted above, would result in a lesser degree of human influences in this sub-watershed than if the structures were present. However, the influences would persist and the effects would likely to persist for at least 10 years and into the foreseeable future. The reaches of High Emigrant Lake and Middle Emigrant Lake may move towards a more pristine condition because of the low existing levels of recreational use, trails, and overall

condition. It is unlikely the lower reaches of the sub-watershed (Emigrant Lake and Cow Meadow Lake) would move closer to a more pristine OC as a result of non-maintenance of the dams because of recreation and trail influences and the potential for fish stocking.

Because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The conscious decision to not manage three of the five dams in Wilderness would likely improve the wilderness experience for some visitors. A segment of the visitors would not be affected, and yet other visitors would continue to have a diminished experience because two of five dams would remain present and maintained.

Middle Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Middle Fork Cherry Creek sub-watershed. These include trail construction, trail reconstruction and maintenance in a small portion of the sub-watershed, dam maintenance and reconstruction, fish stocking, and, both commercial and general recreation use (and the subsequent development of campsites and use areas). Cumulatively, these actions have determined the OC for the Middle Fork Cherry Creek lakes and dams. A more pristine condition has been retained and there has been less apparent effect from human influences in the Red Can Lake and Yellowhammer areas of the sub-watershed. The deterioration of one of three dam structures, in addition to the continuation of the activities noted above, would provide for a reduced degree of human influence in this sub-watershed. The effect is likely to continue longer than the ten-year cumulative effects window. Whether the sub-watershed would move towards a more pristine condition is unknown. The present conditions found in Yellowhammer would most likely be maintained. Although Red Can Lake would be maintained, the low recreational use levels would likely persist. While the Lake may not move closer to pristine, the OC would be maintained and opportunities for solitude would remain high. At Leighton Lake, maintenance of the dam combined with other factors such as the levels of recreation use and potential fish stocking would not move towards a more pristine class in the foreseeable future.

Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. Allowing one of the three to deteriorate in this sub-watershed may slightly improve the wilderness experience for some visitors while others would not be affected. Some visitors would continue to have a diminished Wilderness experience because the dams are present and are actively managed.

West Fork Cherry Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, both commercial and general recreation use (and the subsequent development of campsites and use areas), drift fences to minimize the effects of stock use, and fish stocking. Cumulatively, these actions have determined the OC for the West Fork Cherry Creek lakes/dams. There is a relatively high degree of human influence

on this sub-watershed. Dam maintenance and reconstruction, when combined the continuation of the activities noted above, would continue the degree of human influence and the effect is likely to continue longer than the ten-year cumulative effects window. It is unlikely the sub-watershed would move towards a more pristine condition.

Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The management of the dams in this sub-watershed would likely diminish the wilderness experience for some visitors while others would not be affected.

Lily Creek Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Lily Creek sub-watershed. These include trail construction, trail reconstruction and maintenance, dam maintenance and reconstruction, both commercial and general recreation use (and the subsequent development of campsites and use areas), and the Bell Meadow Bear Lake and Cooper grazing allotments. Cumulatively, these actions have determined the OC for the Lily Creek lakes/dams. There is a relatively high degree of human influence on this sub-watershed. Allowing for the deterioration of two dam structures, when combined the continuation of the activities noted above, would lessen the degree of human influence minimally and the effect is likely to continue longer than the ten-year cumulative effects window. Considering the recreational use levels and grazing authorizations, it is unlikely the sub-watershed would move more than minimally towards a more pristine condition (even with the deterioration of two dams).

Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that are more readily accepted than others, such as trails and signing. The cessation of dams in this sub-watershed would likely improve the wilderness experience for some visitors while others would not be affected.

Upper South Fork Stanislaus River Watershed

Human influences and actions from the past 10 years have shaped the current condition of the Upper South Fork Stanislaus River sub-watershed. These include trail reconstruction and maintenance in a portion of the sub-watershed, both commercial and general recreation use (and the subsequent development of campsites and use areas), and grazing authorizations in the Cooper Allotment. Cumulatively, these actions have determined the OC for this sub-watershed. There has been a moderate effect from human influences in this area. The deterioration of the dams would provide for a reduced degree of human influence in this sub-watershed. When considered with the continuation of recreational use levels and grazing authorizations, it is unlikely the sub-watershed would move towards a more pristine condition (even with the deterioration of both dams). The human influences effect is likely to continue longer than the ten-year cumulative effects window.

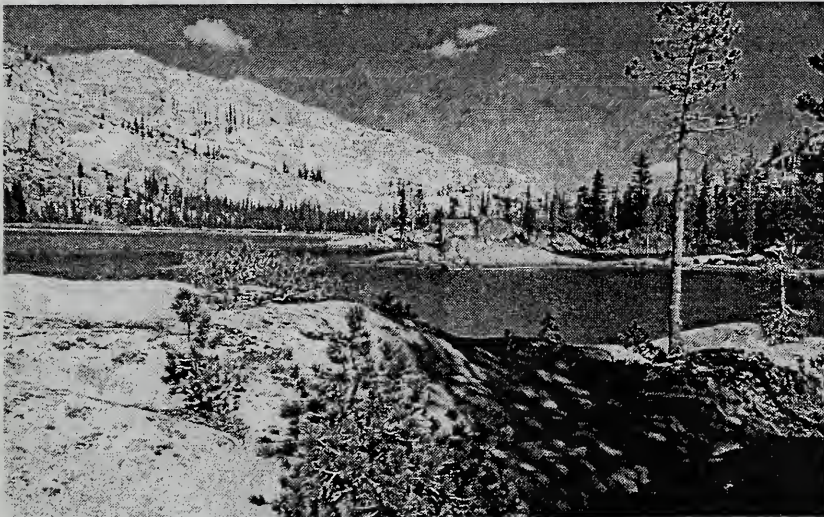
Cumulatively, because of Wilderness inventory and monitoring, those activities that could affect the Opportunity for Solitude and Wilderness character could be adjusted to comply with the OC standards and objectives. Cumulatively, there are some human influences that

are more readily accepted than others, such as trails and signing. The deterioration of both dams in this sub-watershed would likely improve the wilderness experience for some visitors while others would not be affected.

3.2.4.3.3. Other Potential Effects

Refer to Soils, Watershed, Wildlife, Recreation, Visuals, Fisheries, Botany, and Socio-Economic Sections for the effects to other Wilderness processes and resources.

3.3. VISUAL RESOURCES



"The views were unending and spectacular. The horses plodded confidently along while we drank in the scenery."¹
Description from Emigrant Wilderness hiker's web page.

3.3.1. Introduction

Among listed intrinsic wilderness values, the aesthetic element ranks high. Wilderness often contains the awe inspiring unspoiled landscapes rarely found elsewhere and the Emigrant Wilderness is no exception. The Driver and Brown study found enjoying nature, which includes scenery, to be the top ranked experience objective for visits to wilderness.² The geomorphology throughout the Emigrant Wilderness makes it a remarkably valuable scenic resource, and viewing the scenery is a major motivating factor in visits to the area.

Scenic value is based on two important elements, (1) objective information contained within ecological unit descriptions and (2) the cultural values that people assign to landscapes. Together they define the meaning of place and its scenic expression. The combination of these comprises what is known as Landscape Character in the Forest Service system used to analyze scenic values. The dam sites are limited, small areas within the Wilderness, but the setting in which they reside is central to all discussion of their relevance and Landscape Character component.

¹ www.hikingwithmike.com, HikingwithMike, 396 Vester Sted, Solvang, CA 93463.

² Emigrant Wilderness Management Plan, 1998.

3.3.2. General Landscape Components

3.1.2.1. EXISTING CONDITION

The Emigrant Wilderness is in the Glaciated Batholith (M261Eo) subsection of the Sierra Nevada ecological section. This subsection is characterized by steep mountains at the northeastern edge of a plateau that is extensive west of the crest. Some of the rolling plateau west of the crest is included in this subsection. Glacial erosion has modified most of the landforms. Some of the rivers flow in the bottoms of very steep-sided canyons. Mass wasting and fluvial erosion are the primary geomorphic processes. Most of this subsection is sparsely vegetated. The predominant natural plant communities are the mixed subalpine forest series, the red fir series, and the communities of subalpine meadow habitat. Lodgepole pine series prevails on many wet soils and on drier soils where cold air drainage and frost limit the regeneration of other conifers. Sedge meadow communities are common.

Runoff is rapid from most of the area. Maximum flow in these rivers is during spring when snow is melting rapidly. There are many small natural lakes or ponds in glaciated terrain.

Disturbance regimes are fire, seismic activity, and snow avalanches. Lakes in the Emigrant annually fill from snowmelt and draw down one to three feet by evaporation and run-off in the summer. More occurs in drought years. The streamflow dams raise natural lake levels 6 to 10 feet above the natural lake level.

The Stanislaus National Forest Land and Resources Management Plan¹, recognizing the value of the diverse visual resource base in the Forest, uses the Visual Management System² to analyze the scenic resource and evaluate potential impacts of proposed management activities. All of the qualities evaluated and criteria used to designate a wilderness equate with the highest determinants for scenic values. The highest valued natural landscapes have highly varied and distinctive terrain, vegetation, and water forms. The degree of visitor sensitivity to the surroundings is always extremely high in Wilderness and all distances of the viewing plain are pertinent.

All of the Emigrant Wilderness is assigned a Visual Quality Objective (VQO) of Preservation (LMP map I-8). This VQO allows for ecological change only. "Management activities, except for very low visual impact recreation facilities (such as hiking trails), are prohibited."³ The current evaluation tool for visual quality on National Forest lands is the Scenery Management System (SMS).⁴ Using this system, the existing integrity level of Very High (equivalent to Preservation in VMS) refers to landscapes where the valued landscape character is intact with only minute, if any, deviations. The existing landscape character and sense of place is expressed at the highest possible level. To meet a Scenic Integrity Objective (SIO) of Very High, any sign of human occupancy must fade out of view in the landscape.

The opportunity class (OC) objectives⁵ designated for water developments state "the imprint of human influences" will be "unnoticeable in most areas" or "substantially unnoticeable"

¹ Stanislaus National Forest Land and Resource Management Plan, 1991, Management area I.

² USDA Forest Service, 1974 National Forest Landscape Management, vol.2, USDA Handbook Number 462, Washington, DC.

³ IBID

⁴ USDA Forest Service. 1995. Landscape Aesthetics, A Handbook for Scenery Management, USDA Handbook Number 701.

⁵ Emigrant wilderness Management Direction, 2002.

depending on which OC the dam has been allocated. The level of notice dramatically varies given the context of analysis. In the immediate vicinity of the dam, the structures are noticed, but if the context of experience referenced is the whole Wilderness or a portion of it, then the dams in fact become substantially unnoticeable.

3.1.2.2. SENSE OF PLACE

The constructed dams in the Emigrant Wilderness collectively form a cultural connection highly valued by some in the community. The regard for those who imagined and constructed the dams to benefit recreation use (primarily fishing) in the Sierra Mountains is part of resident folklore and tradition. Public comments strongly state not just acknowledgement of the historic value, but a sentiment for these structures as elements in the sense of place experienced here. While some express the personal value of having a relative who helped build the dams, others articulate a value related to simply knowing that local people were involved and that families have been coming to these places for decades to enjoy the assumed benefits created by the dams. The public values cultural enclaves in landscapes that are natural appearing, such as historic structures and other cultural attributes.¹

3.1.2.3. SPECIAL CONSIDERATIONS

The Wilderness Act² definition includes statements regarding preservation of both scenic and historic values. The Emigrant Wilderness dams do not meet the requirements for scenic integrity, but are the focus of a strong sense of place in the community. In past planning and policy regarding these structures, the phrase, "the imprint of man's work [is] substantially unnoticeable," is often quoted. Some say the dams are not substantially noticeable while others say their appearance does not meet this particular requirement of the Act. Each of the eighteen dams is unique. Most are not a single dam, but a collection of structures that confine or retain flows. The visual impact of each dam is different depending on the terrain, size of the impoundment, size of the structure, materials incorporated in construction, and amount of current deterioration.

A naturally occurring straight line made by mineral deposits in standing water appears on rock faces, boulders, and the faces of dams near the lakes. The color intensity, shade, and hue on the surface vary from site to site depending on the mineral source (color of original chemical make-up and response to oxidation) and frequency/duration of periods between inundation and exposure to air. This condition occurs to some degree at all lakes in the Emigrant Wilderness, not only at the lakes impounded by dams. Active lake drawdown at dams over 7 feet³ creates a wider band of surface mineral deposits (termed 'bathtub ring' in previous documents) than would have occurred naturally from evaporation and seasonal run-off.

¹ IBID

² Public Law 88-577 (16 U.S.C. 1131-1136), 88th Congress, Second Session, 9/3/1964.

³ Snow, Bigelow, High Emigrant, Emigrant, Long, Lower Buck, Y-Meadow, Bear

3.3.3. Existing Condition

3.1.3.1 East Fork Cherry Creek

Snow Lake



Snow Lake is accessed by secondary trail 21E10. There are 12 mortared rock dams that vary from 3 to 80 feet long and 1 to 8 feet high. The majority are readily seen from many vantage points around the lake and are highly visible from the northwest side of the lake (outlet).

The line created by mineral deposit on the rocks near the water and on the dam walls is most obvious at low water, but is generally always visible. The minerals on the rocks do not exceed what would be expected in the wilderness. The level tops of the dams and the lines created by these linear structures (and repeated when reflected in the surface of the lake) intrude into the natural lakeside scene. The small dams placed between rock shelves and boulders form unnatural straight lines between irregular and curved natural lines. The regular pattern of rocks in the walls and the bands of mortar do not repeat natural lines in this environment. The dams may draw the eye when seen from the trail, and once seen, are continually noticed. The variation of color from the mineral deposits darkening the surfaces over time has served to blend the shapes, slightly improving the visual anomaly.

Snow Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This is not true in the project area, or in the context of the area around the lake.

Bigelow Lake



Bigelow Lake is accessed by a secondary trail and historic ways from Black Bear Lake and Snow Lake respectively. Five dams of mortared rock construction, 10 to 130 feet long and 1 to 12 feet high, are at this lake. The dams are readily seen from many vantage points around the lake and the larger dams are highly visible.

The face of the main dam at the outlet is visually outstanding, especially with two layers of rock placed at different times. The mortar, when not stained by the mineral deposit, is glaring white and very noticeable. All rock around the lake, predominantly on the south side, has obvious lines from mineral deposits, except in the areas of shore where the vegetation undulates along the edge of the water. The minerals on the rocks do not exceed what would be expected in the wilderness. The level tops of the dams and the lines created by these linear structures (and repeated when reflected in the surface of the lake) intrude into the natural lakeside scene. The dams may draw the eye when seen from the trail, and once seen, are continually noticed. One of the dams is very small and no longer useful. Except for the mortar on the rocks, it would look natural.

Bigelow Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This is true, especially as the context expands.

Horse Meadow



Primary trails accesses Horse Meadow directly, a secondary route comes in from Black Bear Lake, and an historic way connects between trails on the east side of the meadow. The main dam is 25 feet long and 7 feet high and a saddle dam, just east of the main dam, is 15 feet long and 3 feet high.

The main mortared rock dam was built twice and the use of unmatched sizes of rock placed at somewhat irregular intervals make this dam more natural appearing. The deteriorated condition results in a less visible structure and the poor condition provides a natural appearance. The minerals on the rocks do not exceed what would be expected in the wilderness. The saddle dam is a linear element not related to the water level at this time, which is a visual anomaly.

Horse Meadow is in OC III where the imprint of human influences should be substantially unnoticeable. This is true in the project area and at the larger scale of the lake, particularly because of the deteriorated condition of the dam.

Huckleberry Lake



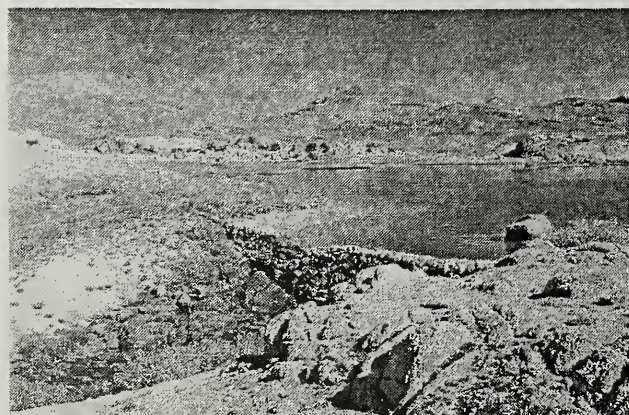
Huckleberry Lake is accessed by a primary trail from the south that traverses the length of the lake and another trail that access the lake on the northeast side. In addition, an historic way comes into the lake at the west end. There are seven mortared rock dams that vary from 4 to 50 feet in length and all but one (3 feet) are 2 feet high. This is a very large lake with wide, broad vistas. The area visually affected by the dams is small compared to the expanse of the entire lake. Because of their low profile, most of the seven dams are not readily visible from the trails.

The largest dam is visible from points near the lake outlet. Straight lines of the dam walls and their level tops do not blend into the grassy marsh dotted by protruding, rounded rocks. Some of the low walls are still covered with unstained mortar. The small dams placed between rock shelves and boulders form unnatural straight lines between irregular and curved natural lines of the grassy meadows and pools. A few dam walls have irregular tops with rocks jutting out, making them less noticeable. Much of the lakeshore has vegetation right up to the water, as well as exposed rock, which is effected by mineral deposits. The minerals on the rocks do not exceed what would be expected in the wilderness.

Huckleberry Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This is true in the project area and accurate when taken in a larger context of the lake.

3.1.3.2 North Fork Cherry Creek

High Emigrant Lake



Access to High Emigrant Lake is via Big Sam Trail. This trail fords the creek below the dam, though many hikers use the dam as a bridge instead. The single dam, 56 feet long and 9 feet high, is located in the southwest end of the lake. Its mortared rock construction is highly visible.

The dam is constructed of volcanic rock gathered from the site. This is different from other Emigrant Wilderness dams that use granitic rock. The terrain is very sparse and bare with generally level surfaces near the lake (forming the basin) so the level top of the dam is not topographically outstanding, although the reflective surface of the dam top does make it outstanding. The shapes and pattern of the rocks in the dam are regular, not natural, and the coloration of rock where the water spills contrasts sharply with the unaffected adjacent rocks. The dam may draw the eye when seen from the trail, and once seen, is continually noticed. The shoreline is gently sloping soil with no rock outcrops; therefore, there is no surface to show mineral deposits, although the vegetation corresponds to changing levels of water in the lake.

High Emigrant Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This is not true in the project area or from wider points of view, as there simply is no vegetation to occlude the view.

Emigrant Meadow Lake

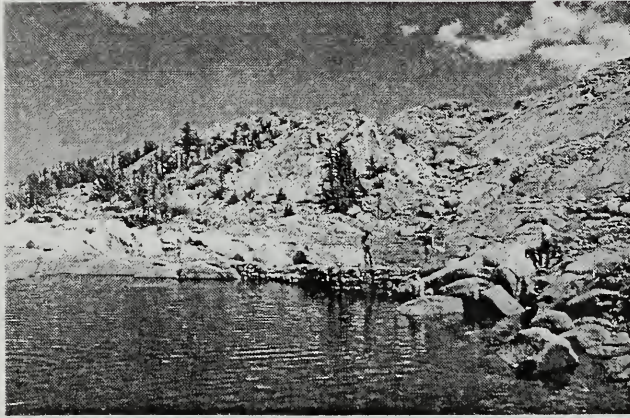


The majority of users to Emigrant Meadow Lake access the lake via a primary trail over Brown Bear Pass and a secondary trail from High Emigrant Lake. The single dam is 60 feet long and 7 feet high. View of the rock masonry of the dam on the west side of the lake is obscured from any of the trails, but noticeable in the immediate vicinity.

The lake is shallow appearing with some gently sloped, grassy shores and some rock ledges protruding into the water. The level top of the dam and the line created by the wall reflected in the surface of the lake intrude into the natural lakeside scene at this one point. The dam is placed between large sloping rock outcrops, creating an unnatural straight line among curved natural shapes. The very dark mineral staining on the face of the dam contrasts sharply with the color of the surrounding rock (except where it is also stained) and makes the unstained line of mortar covering the top stand out more. The latter have a very dark stain line that contrasts with the color and brightness of the natural rock. The minerals on the rocks do not exceed what would be expected in the wilderness.

Emigrant Meadow Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This is not true right at the outlet (project area), but accurate when viewed from almost anywhere else.

Middle Emigrant Lake

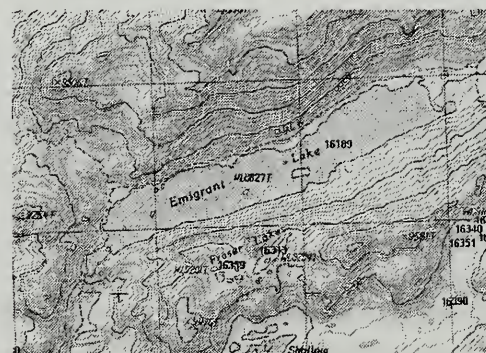
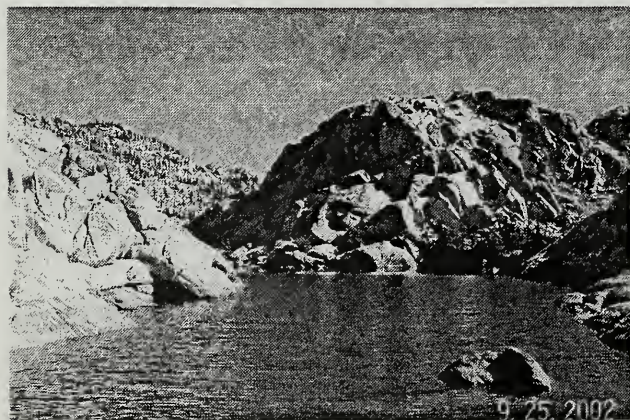


A secondary trail accesses Middle Emigrant Lake from the east and an historic way accesses the lake north and south. The single dam is 40 feet long and 8 feet high. View of the rock masonry on the southwest side of the lake is obscured from the eastern route, but the historic way passes close to the dam and it is visible, looking like a pile of similarly shaped and sized rock on its face and like a rock bridge from lakeside.

There is a narrow soil shelf with grass along most edges and extensive meadow around the lake inlet. The boulders and rock ledges in the project area show mineral deposits but most of the shoreline does not connect with the rock and where it does the line is typical of lakes in the Emigrant. One low, mortared rock structure is found a short distance from the main dam. Although it is not mentioned in the Dam Inspection Report, it is an unnatural appearing structure.

Middle Emigrant Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This standard is not met in the project area, but at the larger lake scale.

Emigrant Lake



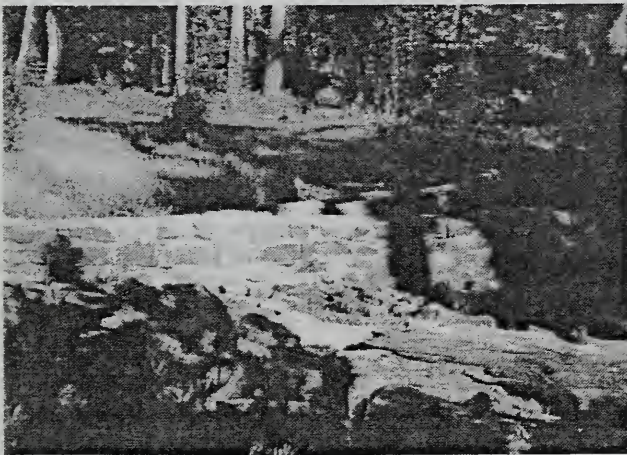
The 80 foot long, 10 foot high mortared rock dam is located at the west end of the lake and is obvious from vantage points in that vicinity and from trails coming from the west, north

(this is the most heavily used access route by both Kennedy meadows Pack Station and private visitors), and an historic way from south.

This is a very large lake with wide, broad vistas and the area visually affected by the dams is small compared to the expanse of the entire lake. The rock used to construct the dam is not the same color as the surrounding rock and the entire structure is readily seen from many viewpoints in the outlet end of the lake. The line created by mineral deposit on the rocks near the water and on the dam walls is most obvious at low water times of the year, but generally always visible.

Emigrant Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This is not true in the project area, but accurate if taken in a larger context of the whole lake.

Cow Meadow Lake



A primary trail accesses Cow Meadow Lake directly on the east side and an historic way accesses the other areas of the lakeside from that trail. The main dam has been destroyed, but three mortared rock dams are still in place (20 to 26 feet long and 1½ to 3 feet high). The dams still in place are obvious, but not easy to find because of their low profile.

The three remaining dams are above the pool level of the lake (no longer impound water) since the main dam no longer exists. Each of these is very unnatural looking, as the mortar is glaring white and the rocks are squared off and laid into the wall evenly (see photo above). These walls were little affected by the deposit of minerals from water inundation. The area where the main dam was built is now more natural appearing, as most of the dam wall is gone, although some scattered rock with mortar remains.

Cow Meadow is in OC III where the imprint of human influences should be substantially unnoticeable. This is true in the area of the main dam and at the scale of the whole lake, but it is not true in the project area.

3.1.3.3 Middle Fork Cherry Creek

Red Can Lake



A historic way accesses the lake from the southwest, a route cross-country from Karl's Lake. The single earth-filled dam has a low profile (8 feet long and 3 feet high) and is overgrown with vegetation, including a tree that may threaten its stability. This small, minor structure looks somewhat unnatural when spotted, but is not obvious to casual observation.

The sod/soil material of this dam blends with the vegetation and soil in the area. Only its crossing of the watercourse between rock outcrops in a linear fashion makes it unsuitable visually. The level of the lake is affected very little by the 20 acre-feet of water impounded by the dam when it is functioning; therefore, the mineral deposit on edges of the lake would not exceed natural variation.

Red Can Lake is in OC II where the imprint of human influences should be unnoticeable in most areas and this dam fits this standard in the project area and when taken in a larger context of the lake area.

Leighton Lake



Leighton Lake is hard to find via a primitive historic way to Karl's Lake then cross-country to Leighton. The single dam is 30 feet long and 7 feet high. The small rock and soil embankment of the dam is not easy to see and many logs jam the lake above the dam.

The regular pattern and shape of the placed rock intrudes into the view of this small drainage, especially since there is a lot of vegetation on either side. Much of the lakeshore is a soil embankment with grasses and shrubs adjacent to the water with very large boulders

interspersed throughout. The mineral deposit is evident on all the rock faces and boulders in the water. The color here is fairly light and the upper level is quite pale, indicating that either the minerals in this location wash off with rainfall or some other natural effect. The mineral patina on the rocks does not exceed what would be expected in the wilderness. Logs accumulating behind the dam are actually concealing some of its linear form from the lakeside.

Leighton Lake is in OC III where the water developments should be substantially unnoticeable. Due to its deteriorated condition, this dam fits the standard in the project area and when taken in a larger context of the lake area.

Yellowhammer Lake



Primitive and cross-country routes from an historic way access Yellowhammer Lake. There is one dam 12 feet long and 3½ feet high. It is a small rock construction without mortar. It is in deteriorated condition and not easily seen. If the observer did not know the rocks came from a dam, they might be viewed as naturally occurring; however, the old cable remaining is an eyesore. The lake is spread out with many small pools and fingers along the shore. Natural mineral deposit occurs on rock near the water.

Yellowhammer Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This is true for Yellowhammer in both the project area and when taken in the larger context of the entire lake area.

3.1.3.4 West Fork Cherry Creek

Long Lake

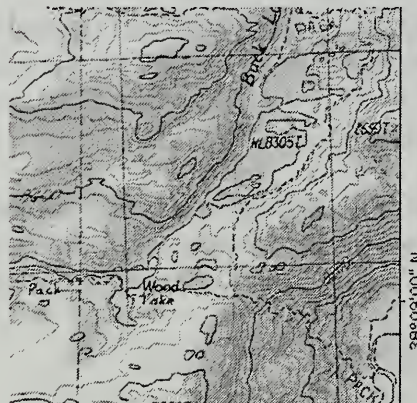


Long Lake is accessed from the south off a primary trail via an historic way that circumvents the lake, or from a secondary trail coming in from primary trail 20E12. There are eight dams of mortared rock construction, four of which are in the primary drainage and are readily seen from vantage points around the outlet end of the lake. The other four dams are low profile and less visible to the passerby. The dams vary from 5 to 34 feet in length and 2 to 9 feet high.

The level tops of the dams and the line created by the linear structure set into multiple, round boulders and sloped granite outcrops are visually obvious. The small dams placed between rock outcrops form unnaturally straight lines between irregular and curved natural lines. The shapes and pattern of the rocks in the larger four dams are too regular to appear natural and the coloration of the rock from mineral deposit contrasts with the unaffected parts of adjacent rocks. The dams may draw the eye when seen from the trail, and once seen, are continually noticed. The natural rock coloration is light gray to warm dark gray while the dam rocks tend toward a warmer red-orange shade. The smaller dams are conspicuous because of their linear nature and white mortar even though they are low. The tops of all the dams have been covered with a light colored mortar so they are particularly reflective and contrasting. Long Lake is surrounded mostly by rock, causing the red colored mineral deposits to be obvious as the water level fluctuates, although the minerals on the rocks do not exceed what would be expected in the wilderness.

Long Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This is not true in the project area, or in the context of the area around the lake.

Lower Buck Lake



The majority of users to Lower Buck Lake access the lake via Lower Buck Lake Spur. This trail leaves the Crabtree Trail and travels along the west side of Upper Buck Lake before crossing between the two lakes and traveling along the eastside of Lower Buck Lake. The single 41 foot long, 2 foot high mortared rock structure is located in the southwest end of the lake and is hidden in a gap that makes seeing the dam difficult unless the viewer is immediately below it.

The colors of the dam contrast sharply with the terrain. The control works well is a different rock (yellow) from the dam wall (gray granite) that has heavy, dark mineral deposit from constant seepage. Mortar has been applied in several locations on the wall many times so the lighter shades of these lines add to the contrast. Some of the rock face has been broken, adding even more contrast where the lighter rock appears. Many logs are jammed behind the dam. Rock outcrops surround the lake and the mineral deposit line is visually

dominant except where a few clumps of shrubs reach the water line. The minerals on the rocks do not exceed what would be expected in the wilderness.

Lower Buck Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This is not true in the project area, but accurate if taken in a larger context of the lake.

3.1.3.5 Lily Creek

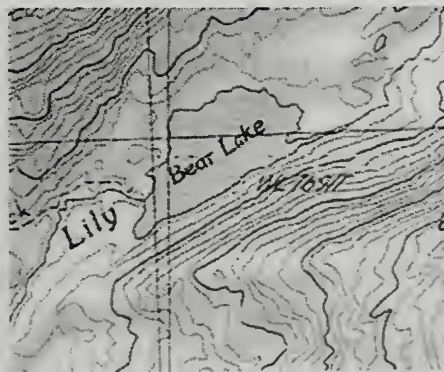
Y-Meadow Lake



Access to Y-Meadow Lake Dam is either from the north along an historic way that leaves Bear Lake Spur, or via an historic way coming from the south. The dam is 88 feet long and 24 feet high. The top of the mortared rock masonry dam is visible from the lakeside near the dam. Visitors coming up the drainage from Bear Lake, or anyone in the vicinity, view the very high, obvious riprap fill structure.

The dam wall on the lakeside is striped with several horizontal lines comprised of different kinds of minerals or possibly other organic substances in the water. The downstream side is filled with large, angular riprap stacked almost to the height of the wall. The lake created by the dam is spread out in a gently sloping valley surrounded by rock faces, all marked by the dark mineral deposit of the high water mark. The minerals on the rocks do not exceed what would be expected in the wilderness. Many rock outcrops intrude crossways into the lake giving a linear feel to the body of water. There is sparse vegetation around the lake and some areas on the south side have banks of bare soil exposed, showing evidence of water level fluctuation. Y-Meadow Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This is not true in the project area (outlet and downstream), but is true at the larger lake scale.

Bear Lake



Access to Bear Lake is via Crabtree Trail and then off a spur to the lake. What is left of the 50 foot long, 10 foot high, mortared rock dam is visible from the trail, but it is considerably deteriorated and overgrown with vegetation so the dam terraces downstream are not exposed.

The rocks and mortar are fairly well suited to the granite rock in the terrain. The lake has considerable rock around it and several rock islands. These are marked with the horizontal mineral deposit typical of lakes in the Emigrant Wilderness. There are many logs in the water and lying on the shore adjacent to the dam. Historic photos show this dam had a substantial appearance when intact, but the battering caused by logs and the annual freezing and thawing is taking a toll in its structural integrity.

Bear Lake is in OC IV where the imprint of human influences should be substantially unnoticeable. This is true in the project area, except in the specific vicinity of the intact walls in the project area, and accurate when taken in a larger context of the lake area.

3.1.3.6 South Fork Stanislaus

Cooper Meadow



Access to Cooper Meadow Dam is via an historic way trail off the Cooper Meadow Trail. The single dam is 66 feet long and 10 feet high. It is constructed intermittently between rock outcrops in the southwestern end of the meadow. The dam is difficult to see due to the grass and silt upstream. Most visitors would overlook the dam due to its location and similar size and shape of nearby rock. However, once the wall is spotted, the level top appears unnatural in the terrain, as do the regularly placed rocks. The stream and pools have deposited some patina on rock faces in the vicinity, a natural occurrence in all lakes in the Emigrant.

Cooper Meadow is in OC III where the imprint of human influences should be substantially unnoticeable. This is not true in the project area, but accurate if taken in a larger context.

Whitesides Meadow



Access to Whitesides Meadow Dam is via the popular Burst Rock Trail. The dam is located at the southwestern end of the lake and is difficult to see due to the grass growing over the structure. The dam is not straight, but curves in an s-shape 118 feet across the meadow. It is 10 feet high. The dam holds a small pool and can be seen in the immediate vicinity, but is not readily visible from the trail. Colors of the rock and mortar are similar to the surrounding rocks. The minerals on the rocks do not exceed what would be expected in the wilderness.

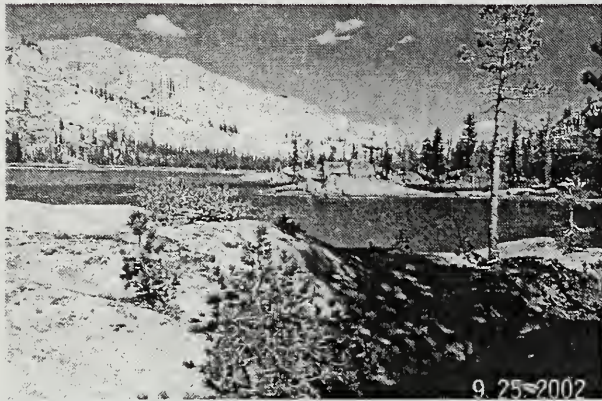
Whitesides Meadow is in OC III where the imprint of human influences should be substantially unnoticeable. This is not true in the project area, but accurate if taken in a larger context.

3.3.4. Effects to Visual Resources

Emigrant Wilderness is a remarkably valuable scenic resource and viewing the scenery is a major motivating factor in visits to the area. The appearance of dam structures at 18 locations within the Emigrant Wilderness is viewed by many as being outside the accepted parameters for wilderness, particularly the "untouched by the hand of man" reference in the Wilderness Act. However, considering there are over 100 named lakes in this 112,000 acre wilderness, the impact is relatively small. It is within this scale that previous evaluations stated that the dams are "substantially unnoticeable." Yet, once the structures are seen, they tend to dominate the visual environment in the vicinity. The historic and cultural values of the dam system also serve to lessen their intrusive nature and even the purist might be curious about the function and story of the dams. Negative impacts to scenery at some of the lakes from the alternatives would be caused by changes in the surface area of lakes from repair and maintenance activities, changes in the condition of shorelines, and changes in the wide band of mineralized watermark on rock faces. Any dams that cease to be maintained would, in the long-term, become standing ruins. Generally, such ruins are perceived as an aspect of the cultural landscape in a Wilderness and the acceptance of that as a part of wilderness scenery varies from person to person.

Scenic expression of the dam structures and impoundment variations is different at each of the 18 locations depending on the terrain, size of impoundment, size of the structure, materials incorporated in construction, and amount of current deterioration. The straight line made by mineral deposits appearing on rock faces, boulders and the faces of dam walls near the lakes is also somewhat different at each location. This condition (mineral deposits), which is endemic to all lakes and ponds in the Emigrant Wilderness, varies for several reasons. Its importance to visual considerations is unique to each of the sites.

Mineral deposits on rock from standing water occur throughout the Emigrant Wilderness:



Mineral deposit at a lake without dam



Mineral deposit at a lake with dam



Mineral deposit at lake with higher dam



Mineral deposit in pool unrelated to dams or lakes

RESPONSE TO ISSUES

There is concern that the loss of any dams would negatively influence the local recreation-based economy. Scenic resources are an important part of the recreation experience. A national survey in 2002 found three quarters of the respondents believe providing scenic beauty is "extremely to very" important as a function of Wilderness¹. If seasonally there is less water in the lakes and this event equates to lower aesthetic value for some people, it is possible fewer visitors would enter the wilderness to enjoy those particular lakes. However, the fundamental recreation motivators for visitation would continue to be found either at the same location with lower water, or at some of the other 100 lakes in the Emigrant Wilderness. Since no surveys regarding this possibility have been done to date, it is not possible to know if visitation to the Wilderness would diminish.

¹"Uses and Values of Wildlife and Wilderness in the United States, National Survey of Recreation and the Environment (NSEW 200) summary Report #2, USDA forest Service & N.O.A.A., 1/15/2002.

3.3.4.1. ALTERNATIVE 1 – PROPOSED ACTION

3.3.4.1.1. Direct and Indirect Effects

East Fork Cherry Creek

Snow Lake

Snow Lake dam would be restored and maintained under this alternative. Flow release downstream would last longer, have better volume, and increase vegetative diversity. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow (leakage), causing withdrawal of the shoreline.

The scenic condition would remain the same as the existing condition with the exception that late season draw down would increase the amount of mineral deposit seen on the rocks and exposed dam walls. Snow Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This standard would not be attained in the project area or the larger visual context of the lakeshore because the dams are evident from many points. New mortar and rocks used in construction repairs would add to the visual anomaly of the structures unless appropriate color of rocks are selected and colored mortar used. Also, if plastic pipe is used for sleeving and exposed to view (not underwater) it should be a dark color, not white.

Bigelow Lake

Bigelow Lake dam would be restored and maintained under this alternative. Flow release downstream would last longer, have better volume, and increase vegetative diversity. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow (leakage), causing withdrawal of the shoreline.

The scenic condition would remain the same as the existing condition with the exception that lake draw down would increase the amount of mineral deposit seen on the rocks and exposed dam walls. Bigelow Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This would not be attained in the project area or the larger visual context of the lakeshore. The face of the main dam at the outlet is visually outstanding, especially the two different layers of rock placed at different times. The mortar, when not stained by the mineral deposit, is glaring white and very noticeable. This is what would occur with any new mortar unless colored mortar is used in construction.

An early, complete draw down of the lake (if selected for construction needs) would impact lake conditions for the entire season including shore location, vegetation, and appearance. If the work were done at the natural low water season, scenery would be less impacted.

Horse Meadow

Horse Meadow would not be maintained under this alternative. The dam would continue to deteriorate; accumulated sediment behind the dam would scour the grade would gradually cut down to the historic channel. The redistribution of sediment could cause a temporary reduction of pools that would change the appearance of the meadow, making it more appealing because visual diversity would increase.

The deteriorated condition would accentuate as years pass, providing increased irregularity and a natural appearance. Collected sediment on the upstream side would entirely obscure the remaining wall of the main dam. The linear element of the saddle dam would continue to be seen as a ruin for hundreds of years. Horse Meadow is in OC III where the imprint of human influences should be substantially unnoticeable. Because of siltation upstream and the limited size of the structures, this would be attained at both the project level and at the larger lake level.

Huckleberry Lake

Huckleberry Lake dams would be restored and maintained under this alternative. Flow release downstream would last longer, have better volume, and increase vegetative diversity. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow (leakage), causing withdrawal of the shoreline.

The scenic condition would remain the same as the existing condition. Huckleberry Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This would be attained in the project area and the larger visual context of the lake. This is a very large lake with wide, broad vistas and the area visually affected by the dams is small compared to the expanse of the entire lake. New mortar and rocks used for construction repairs would add to the visual anomaly of the structures unless colored mortar is used. Also, if plastic pipe is used for sleeving and exposed to view (not underwater) it should be a dark color, not white.

Much of the lakeshore has vegetation right up to the water, as well as exposed rock, which is stained by mineral deposits. The greater draw down occurring when this lake has a functioning valve and a scheduled release would seasonally increase the amount (height) of exposed rock and the mineral deposits would appear in a higher, wider band of discoloration.

North Fork Cherry Creek

High Emigrant Lake

Under this alternative, the dam and control valve would be restored, and potentially more of the storage capacity could be used to augment downstream flow. Flow release downstream would last longer, have better volume, and increase vegetative diversity. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow (leakage), causing withdrawal of the shoreline.

The scenic condition would remain the same as the existing condition. This is a very open lake with no timber and significant rock exposure. The single dam, 56 feet long and 9 feet high, is located in the southwest end of the lake and its mortared rock construction is highly visible. The dam is constructed of volcanic rock gathered from the site. This is different from other Emigrant Wilderness dams. New mortar and type of rocks used for construction would add to the visual anomaly of the dam wall if the same volcanic rock and colored mortar are used. Also, if plastic pipe is used for sleeving and exposed to view (not underwater) it should be a dark color, not white.

High Emigrant Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This condition is not attained now and would not be after the

dam is fully functioning following repairs and maintenance. This is true at both the project area scale and at the scale of the entire lake.

Flow management at High Emigrant, in concert with stream flow maintenance dams at Emigrant Meadow, Middle Emigrant and Emigrant Lakes, cumulatively impacts the visual environment of the stream system at Emigrant Lakes and downstream through the North Fork Cherry Creek watershed. Thus, the visual environment would be altered in the entire system. The visual aesthetic of the stream would be improved, but the visual condition of the lakeshores would be negatively affected during the draw down period.

An early, complete draw down of the lake (if selected for construction needs) would impact lake conditions for the entire season including shore location, vegetation, and appearance. If the work were done at the natural low water season, scenery would be less impacted.

Emigrant Meadow Lake

Under this alternative, the dam and gate would be maintained in their present good condition. The reservoir surface elevation would remain the same, thus there would be no change in the visual appearance of the lake. The release of stored water would continue to augment downstream flow. If more water is released at some point, the lake may be drawn down further than at present during dry years. Flow release downstream would last longer, have better volume, and increase vegetative diversity. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow (leakage), causing withdrawal of the shoreline.

The scenic condition would remain the same as the existing condition. Emigrant Meadow Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. At the project level, the OC objective is not currently being met. At the lake level scale, the OC object is being met. This alternative would not change at either the project or the lake level scales.

The very dark mineral staining the face of the dam contrasts sharply with the color of the surrounding rock (except where it is also stained) and makes the unstained line of mortar on top of the wall stand out more. New mortar and rock would make the wall more noticeable unless colored mortar is used to reduce this impact. If colored mortar is used, the existing line of mortar could be altered to improve its appearance as well.

Middle Emigrant Lake

The repair of Middle Emigrant Lake dam would raise the impoundment 3 feet at full capacity. The lake acreage would be restored to the previous impoundment level of 25 acres. Flow release downstream would last longer, have better volume, and increase vegetative diversity. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow (leakage), causing withdrawal of the shoreline.

Middle Emigrant Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This would not be true at Middle Emigrant, except at the lake scale. New mortar and rocks used in construction repairs would add to the visual anomaly of the structures unless rocks of appropriate color are selected and colored mortar used.

Increased seasonal draw down would change the appearance of vegetation on the narrow soil shelf all along most edges and extensive meadow at the inlet.

Emigrant Lake

This alternative would include the repair of the flow control valve enabling increased use of the Emigrant Lake reservoir water storage and release capability. Flow release downstream would last longer, have better volume, and increase vegetative diversity. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow (leakage), causing withdrawal of the shoreline.

The scenic condition would remain the same as the existing condition with the exception that flow management and release of stored water would gradually draw down Emigrant Lake during the late summer and early fall. If all impounded water were released, the surface area of the lake would diminish in elevation by 9 feet and 50 surface acres of lake. (The existing uncontrolled water release generally does not result in the release of all impounded water.) When this occurred, the shore would recede, the previously inundated area would lack vegetation, and a large band of the rock with mineral deposit discoloration would be visible.

An early, complete draw down of the lake (if selected for construction needs) would impact lake conditions for the entire season including shore location, vegetation, and appearance. If the work were done at the natural low water season, scenery would be less impacted.

Emigrant Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This is a very large lake with wide, broad vistas and the area visually affected by the dams is small compared to the expanse of the entire lake. At the scale of the lake "substantially unnoticeable" would be met. In the project area, this would not be met. The rock used to construct the dam is not the same color as the surrounding rock and the entire structure is readily seen from many viewpoints in the outlet of the lake. This contrast would be more obvious if new mortar or rocks used for construction added inappropriate colors, sizes, or textures to the dam wall. Also, if plastic pipe is used for sleeving and exposed to view (not underwater) it should be a dark color, not white.

Cow Meadow

In this alternative, the main dam would be reconstructed. This would raise the lake level 3 feet and the three small rock dams would be retaining water again. The maximum depth would increase from 33 to 36 feet deep and 18 acres would be added to the surface area.

The area where the main dam was located would now be less natural appearing (the deteriorating condition was a visual improvement) and the shapes and pattern of the new mortar and rocks would be regular, appearing unnatural. The smaller, very unnatural looking walls would now be partially hidden by the water and they would be subject to mineral stains, which would improve the glaring white of the mortar. Cow Meadow is in OC III where the imprint of human influences should be substantially unnoticeable. Repairs of the dam to increase the lake level would not meet this in the vicinity of the lake, nor at the scale of the lake.

Middle Fork Cherry Creek

Red Can Lake

This dam is not repaired or maintained in this alternative.

Deterioration of the single earth-fill dam would continue, including the potential blow-down of a tree that may threaten the stability of the dam. Red Can Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This dam fits this standard and would revert to a very natural condition relatively soon (less than 10 years).

Leighton Lake

Restoration of the integrity of the dam and repair of the valve would increase the maximum depth and enable release of some water to augment downstream flow. Flow release downstream would last longer, have better volume, and increase vegetative diversity. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow (leakage), causing withdrawal of the shoreline.

The area where the main dam was located would now be less natural appearing (the deteriorating condition was a visual improvement) and the shapes and pattern of the new mortar and rocks would be regular, appearing unnatural. Leighton Lake is in OC III where the imprint of human influences should be substantially unnoticeable. The deteriorated condition of this dam provided a more unnoticed condition than reconstruction would. When the rock and soil embankment of the dam is rebuilt, it would be more visible. The regular pattern and shape of the placed rock would intrude into the view of this small drainage. The mineral deposit would continue to be evident on all rock faces and boulders that are in the water. Logs would continue to accumulate behind the dam concealing some of its linear form from lakeside and when the logs are removed periodically for maintenance, the dam would stand out more. The OC objective would not be met either at the project area or lake scale.

Yellowhammer Lake

This dam would not be repaired or maintained. In its current condition, the dam does not impound water, although it slows release of water during wet periods. As the dam further deteriorates, seasonal flooding would diminish. Those drier conditions in the future (unknown timing) might change the mix of vegetation causing a reduction in diversity and visual appeal. As the dam deteriorates, it would become more unnoticeable in most areas and meet the standard for water developments in the Emigrant Wilderness at both the project area and lake scale.

West Fork Cherry Creek

Long Lake

In this alternative, the dams would be sealed, but no wall repair is necessary and the valve system is still functional. The visual conditions with maintenance would remain the same as now exist. Flow release downstream would last longer, have better volume, and increase vegetative diversity. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow (leakage), causing

withdrawal of the shoreline. The release of stored water would improve the setting and aesthetic appeal along the stream.

The natural rock coloration is light gray to warm dark gray and the dam rocks tend toward a warmer red-orange shade. The smaller dams are conspicuous because of their linear nature and white mortar even though they are low. The tops of all these dams have been plastered with light colored mortar so they reflect light and contrast with native surrounding rock. New mortar for sealing the dam would add to the visual anomaly of the dam wall unless colored mortar is used.

Long Lake is in OC II where the imprint of human influences should be unnoticeable in most areas. This would not be attained in the project area or the visual context of the entire lake because the dams are evident from many points.

Lower Buck Lake

Reconstruction and flow regulation would maintain conditions similar to the current leakage from the existing dam. The recommended early draw down of the lake in order to complete the repairs would impact lake conditions for the entire season, including shore location, vegetation, fish, and appearance.

The scenic condition would remain the same as the existing condition with the exception that the late season draw down would increase the amount of mineral deposit seen on the rocks and exposed dam walls. Lower Buck Lake is in OC III where the imprint of human influences should be substantially unnoticeable. This would not be attained in the vicinity of the lake outlet or at the larger scale of the lake. The colors of the dam contrast sharply with the terrain. The control works well is a different rock (yellow) from the dam wall (gray granite), which has heavy, dark mineral deposit from constant seepage. Mortar has been applied in several locations on the wall many times so the lighter shades of these lines adds to the contrast. Some of the rock face has been broken, adding even more contrast where the lighter rock appears. New mortar and rocks in the construction repairs would add to the visual anomaly of the structures unless colored mortar is used. Also, if plastic pipe is used for sleeving and exposed to view (not underwater) it should be a dark color, not white.

Lily Creek

Y-Meadow

Repair of the dam and valve would enable more of the stored water to be released during dry periods. Summer and fall release from Y-Meadow dam supports stream flow between the dam and Bear Lake. This is advantageous to the aesthetic of the stream.

The scenic condition would remain the same as the existing condition with the exception that the late season draw down would increase the amount of mineral deposit seen on the rocks and dam walls. The substantial appearance of the 24-foot high riprap would continue to be a visual anomaly. Y-Meadow is in OC III where the imprint of human influences should be substantially unnoticeable. This would not be attained in the vicinity of the lake outlet or the visual context of the lakeshore because the dam is evident from many points. However, this is a large lake that stretches out to the east and vision of the back of the dam is obscured; therefore, within the context of the entire seen area of the lake, an unnoticeable condition would be met. New mortar and rocks used in construction repairs would add to the visual anomaly of the structures unless rocks of appropriate color and colored mortar are

used. Also, if plastic pipe is used for sleeving and exposed to view (not underwater) it should be a dark color, not white.

The recommended early draw down of the lake in order to complete the repairs would impact scenery around the lake including shore location, vegetation, and appearance of the shore and adjacent meadow.

Bear Lake

Under this alternative, Bear Lake dam would not be maintained. The dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. Scenic condition may reduce as the volume of the lake reduces.

As the dam deteriorates, it would become more unnoticeable in most areas and meet the standard for water developments in the Emigrant Wilderness. Bear Lake is in OC IV where the imprint of human influences should be substantially unnoticeable. This would not be achieved in the project area, but would be achieved at the lake level. Continued deterioration and progression toward natural appearing would move this structure in that direction, but the standing ruins would remain for hundreds of years. The rock faces marked with the horizontal mineral deposit typical of lakes in the Emigrant Wilderness would always be there.

South Fork Stanislaus

Cooper Meadow Lake

Under this alternative, the dam would gradually deteriorate and the streambed would return to its former grade. The maximum depth of pools in the meadow would decrease and loss of pools reduces scenic diversity in the meadow. The dam is difficult to see now due to the grass and silt upstream. Most visitors would overlook the dam due to its location, size, and shape that are similar to nearby rock. However, once the wall is spotted, the level top appears unnatural in the terrain, as does the regularly placed rocks. As the dam wall deteriorates, it would become more unnoticeable in many areas, although it would not meet the standard for water developments in the project area, as the ruins would remain standing for hundreds of years. It would meet the standard at the lake scale.

Whitesides Meadow

Under this alternative, the dam would not be maintained and operated, but continue to exist and function as a meadow maintenance structure for years to come. It is estimated the dam would deteriorate and stop holding water after approximately 50 years. The existing scenic condition would continue until deterioration of all mortar and stacked rocks takes place, over the course of hundreds of years. Whitesides Meadow dam is in OC III where the imprint of human influences should be substantially unnoticeable. This would not be true in the project area, but it would meet this objective at the lake level.

3.3.4.1.2. Cumulative Effects

There are no cumulative effects regarding scenic resources for this alternative.

3.3.4.1.3. Other Potential Effects

Release of impounded water after dams are repaired and operational may draw down some lakes more than occurs under existing conditions. This would be particularly true of Long, Lower Buck, High Emigrant, Snow, and Bigelow. The changes in shoreline from lake storage at capacity to natural lake level would be noticeable because the exposed lake bottom would have no vegetation. This would occur late in the season (September-November) and because the magnitude of the draw down exceeds the similar effect of natural conditions at these high Sierra lakes, the scenery would be less appealing.

3.3.4.2. ALTERNATIVE 2 – NO ACTION

3.3.4.2.1. Direct and Indirect Effects

East Fork Cherry Creek

Snow Lake

Under this alternative, the dam would eventually deteriorate, then breach, and the water level would revert to the natural lake surface elevation. The water depth would drop 10 feet and the lake's surface area would decrease by 8 acres.

For the foreseeable future, the existing condition for scenery would continue as it currently is; therefore, the dam would not meet the OC objective in the project area, but would when taken in the larger context of the lake area. As the dam walls degrade and more water escapes, the gradual changes in the shoreline of the lake would not affect the scenic condition. However, as the visibility of rock faces discolored by mineral deposits increases in height, it would be increasingly more noticeable as the height reaches 10 feet. Once the lake level drops to natural level (25-50 years), there would be less freeze/thaw effect on the rock walls and their deterioration would slow. The standing walls scattered around the outlet, some of them 10 feet tall, would be more visually dominant and intrude into the natural setting as ruins rather than as dams. The walls unnatural appearance at Snow Lake would last a very long time (500-1000 years).

Bigelow Lake

Under this alternative, the dam would not be maintained, eventually deteriorating, then breaching. The water level would then revert to the natural lake surface elevation. Lake depth could drop 9 feet and the lake's surface area decline by 10 acres.

For the foreseeable future, the existing condition for scenery would as it currently is. That is, the OC objective would be met at both scales, project area and the entire lake. As the dam walls degrade and more water escapes, the gradual changes in the shoreline of the lake would not affect the scenic condition. However, as the visibility of rock faces discolored by mineral deposits increases in height, it would be increasingly more noticeable as the height reaches 10 feet. Once the lake level drops to natural level (25-50 years), there would be less freeze/thaw effect on the rock walls and their deterioration would slow. The standing walls scattered around the outlet, some of them 10 feet tall, would be more visually dominant and intrude into the natural setting as ruins rather than as dams. The walls unnatural appearance at Bigelow Lake would last a very long time (500-1000 years).

Horse Meadow

The direct and indirect effects of not maintaining Horse Meadow dam would be the same as Alternative 1 (Proposed Action).

Huckleberry Lake

Not repairing or maintaining the dams would cause the lake depth to decrease by four feet eventually and the lake's surface area to decrease by 25 acres.

For the foreseeable future, the existing condition for scenery would continue as it currently is. That is, the OC objective would be met in the project area, but would be met in the larger context of the lake. As the dam walls degrade and more water escapes, the gradual recession of the shoreline would not change appearance of the lake environment noticeably, nor would the height of the mineral deposits on the rock faces and shoreline boulders be a visual anomaly. The four feet of discoloration is very close to the height of the natural width of mineral deposit caused by annual draw down in lakes in the Emigrant. The dam walls are very low and would not be visually dominant or intrude into the natural setting more than they do now. Once the lake level drops below the dam walls (10-25 years) there would be less freeze/thaw effect; thus, deterioration would slow down and the walls near the outlet of Huckleberry Lake would last a very long time (200-500 years).

North Fork Cherry Creek

High Emigrant Lake

Under this alternative, the dam would not be maintained, eventually deteriorating, then breaching. The water level would then revert to the natural lake surface elevation. The deterioration of the High Emigrant dam would eventually lower lake depth by 8 feet and surface area by 4 acres.

For the foreseeable future the existing condition for scenery would continue as it currently is. That is, the OC objective would not be met in either the project area or at the scale of the lake. Mineral deposits on the rock face at the outlet and on shoreline boulders are obvious as the lake draws down naturally, but would become more visually dominant when the lake stays at its lower level. The level band of mineral deposit discoloration would eventually be eight feet high. Once the lake level drops below the dam walls (10-25 years), deterioration would slow. The standing wall eight feet tall in a highly visible location would be more visually dominant and intrude more into the natural setting as ruins rather than as a dam. The walls unnatural appearance at High Emigrant Lake would last a very long time (500-1000 years).

Emigrant Meadow Lake

Under this alternative, the dam would not be maintained, eventually deteriorating, then breaching. The water level would then revert to the natural lake surface elevation. The lake's surface elevation would eventually drop six feet and the surface area shrink by 13 acres.

For the foreseeable future, the existing condition for scenery would continue as it currently is. That is, the OC objective would not be met in the project area, but would be met from the scale of the lake. Would not be substantially unnoticeable in the project area, but accurate if

taken in the larger context? As the dam walls degrade and more water escapes, the gradual changes in the shoreline of the lake would not affect the scenic condition. The mineral deposits on the rock face at the outlet and on shoreline boulders are obvious as the lake draws down naturally, but would become more visually dominant when the lake stays at its lower level. The level band of mineral deposit discoloration would be six feet high. Once the lake level drops to its natural level (25-50 years), there would be less freeze/thaw effect on the rock walls and their deterioration would slow. The standing 7-foot high wall with the control wall attached would be unnatural appearing and would be more visually dominant, intruding into the natural setting as ruins rather than as a dam. The wall's unnatural appearance at Emigrant Meadow Lake would last a very long time (500-1000 years).

Middle Emigrant Lake

Under this alternative, the dam would not be maintained and continue gradually deteriorating. The loss of the remaining functional 3 feet of the dam would reduce the depth of the lake back to the natural lake level and reduce the surface area by approximately 4 acres.

For the foreseeable future the existing condition for scenery would continue as it currently is. That is, the OC objective would not be met in the project area, but would be met at the scale of the lake. The gradual recession of the shoreline as the lake diminishes would not change the appearance of the lake environment noticeably. The mineral deposits on the rock faces and on shoreline boulders are obvious higher because the breach reduced the lake level. The height would increase to seven feet and be more noticeable. The eight foot height of the dam has already been reduced by the breached 30-foot section, but the remaining 5-8 foot high wall is 50 feet long and when fully exposed would be visually dominant and affect the scenic integrity of the lake at the outlet. Once the lake level drops to its natural level (25-50 years), there would be less freeze/thaw effect on the rock walls and their deterioration would slow. The wall's unnatural appearance near the outlet of Middle Emigrant Lake would last for a long time (500-1000 years).

Emigrant Lake

Under this alternative, the dam would not be maintained, eventually deteriorating, then breaching. The water level would then revert to the natural lake surface elevation. Loss of the dam would result in a decrease in lake depth of nine feet, and a loss of 50 acres of the lake's surface area.

For the foreseeable future, the existing condition for scenery would continue as it currently is. That is, the OC objective would not be met in the project area, but would be met if taken in a larger context of the whole lake. As the dam walls degrade and more water escapes, the gradual changes in the shoreline of the lake would not affect the scenic condition. However, as the visibility of rock faces discolored by mineral deposits increases in height, it would be increasingly more noticeable as the height reaches nine feet. Once the lake level drops to its natural level (25-50 years), there would be less freeze/thaw effect on the rock walls, no logs battering the top, and wall deterioration would slow. The standing ruin of the dam wall ten feet tall would be more visually dominant and intrude into the natural setting more as ruins rather than as a dam. The walls unnatural appearance at Emigrant Lake outlet would last a very long time (500-1000 years).

Cow Meadow Lake

The main dam is already seriously deteriorated and not retaining water; therefore, the lake is already at its natural level.

For the foreseeable future, the existing condition for scenery would continue as it currently is. That is, the OC objective would not be met in the project area, except at the main dam where the dam is all but gone. In addition, the objective would be met if taken in a larger context of the whole lake. Since the lake level has dropped below the dams, there is not much freeze/thaw effect or battering by logs in the water. Deterioration has slowed and the unnatural appearance of dam walls, inconsistent with high scenic integrity, would be resident for many years into the future (500-1000 years).

Middle Fork Cherry Creek

Red Can Lake

The direct and indirect effects of not maintaining Red Can dam would be the same as Alternative 1.

Leighton Lake

Under this alternative, the dam would not be maintained. The complete loss of the dam would lower the elevation by 6 feet and decrease the maximum surface area by 4 acres. Current deterioration is such that the dam does not retain water, the lake is at its natural level except during flooding, but the basic structure of the dam is stable. The regular pattern and shape of the placed rock intrudes into the view of this small drainage. Leighton Lake is in OC III where the imprint of human influences should be substantially unnoticeable. The dam would be noticeable in the project area and in the lake vicinity, although accumulated logs would obscure the linear form of the top of the dam when they are present. The mineral deposit up to 6 feet would continue to be evident on all the rock faces and boulders along the edges of the lake. The standing ruin of the dam and the wide base tapering to the top would be visible and intrude into the natural setting as much as a ruin as it does as a dam. The dam in the outlet would last a very long time (200-500 years).

Yellowhammer Lake

The direct and indirect effects of not maintaining Yellowhammer Lake dam would be the same as Alternative 1.

West Fork Cherry Creek

Long Lake

Under this alternative, the dams would gradually deteriorate and the lake would revert to the original basin. The reservoir depth would decrease by 8 feet and the lake's surface would decrease by 13 acres.

For the foreseeable future, the existing condition for scenery would continue as it currently is. That is, the OC objective would not be met in the project area, but would be met if taken in a larger context of the whole lake. The gradual recession of the shoreline, 13 acres over the course of many years, would not alter the appearance of the lakeshore environment

noticeably. The height of the mineral deposits on the rock faces and on shoreline boulders (eight feet high) would create a visual anomaly in the setting because none of the lakes in the Emigrant would naturally have a band of discoloration that high. Once the lake level drops to its natural level (25-50 years), there would be less freeze/thaw effect on the rock walls, no logs battering the walls, and their deterioration would slow. The standing walls scattered around the outlet, some of them 8 feet tall, would be more visually dominant and intrude into the natural setting more as ruins than as dams. The wall's unnatural appearance at Long Lake would last a very long time (500-1000 years).

Lower Buck Lake

Under this alternative, the dam would not be maintained. It would continue to deteriorate until it could no longer retain water and eventually disappear. Loss of the dam would result in a decrease in lake depth of 10 feet and loss of 8 acres of surface area.

For the foreseeable future, the existing condition for scenery would continue as it currently is. That is, the OC objective would not be met in the project area, but would be met if taken in a larger context of the whole lake. When the dam walls degrade and eventually breach, the gradual changes in the shoreline of the lake would not affect the scenic condition. However, increased visibility of rock faces discolored by mineral deposits would be noticeable as the height reaches ten feet. During the years when the dam walls are standing, yet no longer impound water, they would be more visually dominant and intrude into the natural setting more than they do now. Once the lake level drops to its natural level (50-100 years), there would be less freeze/thaw effect on the rock walls, no logs battering the walls, and their deterioration would slow. The standing walls scattered around the outlet, some of them ten feet tall, would be more visually dominant and intrude into the natural setting more as ruins than as dams. The wall's unnatural appearance at Lower Buck dam would last a very long time (500-1000 years).

Lily Creek

Y-Meadow

Y-Meadow dam is a large structure that would likely persist in some form for many, many years, even without maintenance. Eventually, as the top of the dam deteriorates, less water would be stored and released through seepage and the lake would gradually diminish.

The scenic condition would remain the same as the existing condition for a very long time (50-100 years). That is, the OC objective would not be met in the project area, but would be met if taken in a larger context of the whole lake. The substantial appearance of the 24-foot high riprap of large boulders would continue to be a visual anomaly. When the dam finally does deteriorate and no longer holds water, the lakebed would return to some type of meadow, but accumulations of sediment behind Y-Meadow dam would prevent full expression of the pre-dam riparian conditions. Although the conditions would not be as they were in the past, the valley where the lake had been would achieve some level of natural appearance and may or may not achieve very high scenic integrity. These conditions are very far in the future, closer to the thousand-year end of the spectrum in the engineer's estimate (500-1000 years).

Bear Lake

The direct and indirect effects of not maintaining Bear Lake dam would be the same as Alternative 1.

South Fork Stanislaus

Cooper Meadow Lake

The direct and indirect effects of not maintaining Cooper Meadow Lake dam would be the same as Alternative 1.

Whitesides Meadow

The direct and indirect effects of not maintaining Whitesides Meadow dam would be the same as Alternative 1.

3.3.4.2.2. Cumulative Effects

The appearance of the large number of standing ruins from dam walls created by this alternative, and ruins of cabins remaining in the Emigrant Wilderness, cumulatively detract from the wilderness character of the scenery.

3.3.4.3. ALTERNATIVE 3 – HERITAGE

3.3.4.3.1. Direct and Indirect Effects

East Fork Cherry Creek

Snow Lake

The direct and indirect effects of not maintaining Snow Lake dam would be the same as Alternative 2.

Bigelow Lake

The direct and indirect effects of maintaining Bigelow Lake dam would be the same as Alternative 1.

Horse Meadow

The direct and indirect effects of not maintaining Horse Meadow dam would be the same as Alternative 1 and 2.

Huckleberry Lake

The direct and indirect effects of not maintaining Huckleberry Lake dam would be the same as Alternative 2.

North Fork Cherry Creek*High Emigrant Lake*

The direct and indirect effects of not maintaining High Emigrant Lake dam would be the same as Alternative 2.

Emigrant Meadow Lake

The direct and indirect effects of maintaining Emigrant Meadow Lake dam would be the same as Alternative 1.

Middle Emigrant Lake

The direct and indirect effects of not maintaining Middle Emigrant Lake dam would be the same as Alternative 2.

Emigrant Lake

The direct and indirect effects of maintaining Emigrant Lake dam would be the same as Alternative 1.

Cow Meadow

The direct and indirect effects of not maintaining Cow Meadow dam would be the same as Alternative 2.

Middle Fork Cherry Creek*Red Can Lake*

The direct and indirect effects of maintaining Red Can Lake dam would be the same as Alternative 1.

Leighton Lake

The direct and indirect effects of maintaining Leighton Lake dam would be the same as Alternative 1.

Yellowhammer Lake

The direct and indirect effects of not maintaining Yellowhammer Lake dam would be the same as Alternative 1 and 2.

West Fork Cherry Creek*Long Lake*

The direct and indirect effects of maintaining Long Lake dam would be the same as Alternative 1.

Lower Buck Lake

The direct and indirect effects of maintaining Lower Buck Lake dam would be the same as Alternative 1.

Lily Creek

Y-Meadow Lake

The direct and indirect effects of not maintaining Y-Meadow Lake dam would be the same as Alternative 2.

Bear Lake

The direct and indirect effects of not maintaining Bear Lake dam would be the same as Alternative 1 and 2.

South Fork Stanislaus

Cooper Meadow Lake

The direct and indirect effects of not maintaining Cooper Meadow Lake dam would be the same as Alternative 1 and 2.

Whitesides Meadow

The direct and indirect effects of not maintaining Whitesides Meadow dam would be the same as Alternative 1 and 2.

3.3.4.3.2. Cumulative Effects

There are no cumulative effects regarding scenic resources in this alternative.

3.4. HERITAGE RESOURCES

3.4.1. Emigrant Wilderness General History

3.4.1.1 EARLY NATIVE AMERICAN USE

Documented information on prehistoric land use within the Stanislaus National Forest is based on ethnographic, linguistic, and archaeological data of the Sierra Miwok, Washo, and Mono Lake Paiute.

The upper foothill and mountain Miwok followed seasonally determined occupation patterns that took advantage of plant materials (food, fiber, and medicine) and the migratory mule deer herds. Permanent winter villages were established below the snow line. Early summer villages, temporary camps, and fishing and food processing stations were located along the routes to summer camps at higher elevations. A warm dry climatic interval during this period (Horseshoe Bend Phase AD 1300-1848) allowed an extended occupation season at high elevations (Morratto, 1984).

Centered around Lake Tahoe, the Washo occupied the eastern slope of the Sierra Nevada, the western edge of the Great Basin, and co-existed with the Miwok at the high elevations between the Middle and North Forks of the Stanislaus River. The Washo shared many cultural traits with the Miwok: coiled basketry, bedrock mills, conical bark houses, and similar land utilization.

The Mono Lake Paiute partook of seasonally available plants and animals (e.g. pinyon nuts and Inyo mule deer) in the Mono Basin, the surrounding foothills, and mountains of the eastern Sierra Nevada. Families sometimes wintered with the Sierra Miwok in Yosemite. An ecotone between the Great Basin and the western evergreen forests, the migration of Inyo mule deer into California mule deer range, and the high density of prehistoric sites suggests the Paiute came to the western slope when summer opened the mountain passes. Prehistoric trans-Sierra traffic must have been based on commodities exchange, especially during periods of intense obsidian production. However, volcanic outcrops, quartz, and petrified wood from the west slope provided additional materials for stone technology (Colston, 1985).

Work by Anderson (1993) has documented use of fire by California Indian tribes in managing the landscape for food and cultural products. However, Alderson (1987) pointed out that there is no conclusive evidence that the Miwok set fires at the higher elevations. It is not known how much if any burning indigenous peoples did within the Emigrant Wilderness area.

3.4.1.2 HISTORIC LAND USE

The Emigrant Wilderness appears to have had only episodic non-native use during historic times. Emigrants and explorers continued to report evidence of Indian occupation into the late 1800s. The first white man known to have crossed the Sierra was Jedediah Smith who traveled the crest from west to east. He first arrived in southern California, controlled by the Spanish, in 1826. Governor Echandia ordered Smith and his men to leave the area in 1827. Smith headed north over the Tehachapi and arrived in the Central Valley. They continued up along the foothills for roughly 300 miles where they began their first attempt to cross the mountains. Failing, they returned to the foothills. Smith took two companions, seven horses, and two mules, and traveled further north to what has been identified as the Stanislaus River. On May 20, 1827, they started for the summit along what is thought to be the present route of the Sonora Mono road (State Highway 108). They continued up to the Relief valleys and crossed the summit south of the present day Sonora Pass. It took them 20 days to return to the Salt Lake area with the loss of nearly all their livestock (Stanislaus Interpretive Files, n.d.a.).

Explorers, trappers, and later emigrants to California soon followed Smith across the mountains. Joseph Walker, in 1837, and the Bartleson-Bidwell party in 1841, were some of the first to make the crossing in the Sonora Pass area. The discovery of gold in 1848 brought the miners and began the main migration into California. The principle route traveled began at Leavitts Meadow on the east side of the Sierra. It ran along the west fork of Walkers River and on up to the summit of Emigrant Pass (located within the Emigrant Wilderness). From there, the trail ran west down to Summit Creek and into the Relief valleys. The trail then turned west to "Birth or "Burst" Rock and on down Dodge Ridge to Strawberry Meadow, now Pinecrest Lake. It continued down to Sonora and beyond along approximately the same route that state Highway 108 follows today.

It is not known exactly how many crossed the Sierra along the Emigrant Trail, which was also known as the West Walker-Sonora Route, and the figures vary from several hundred people to several thousand (Stanislaus Interpretive Files n.d.a.). Approximately 405 people, 135 wagons, and over 3,000 head of livestock crossed the summit at Emigrant Pass between 1851 and 1853. Among these was the Clark-Skidmore party in 1851 and the Wash and Duckwall parties in 1853. In 1852 the city of Sonora, in an attempt to attract more of the west bound emigrants into their area, sent Joseph Moorehead to the Humboldt Sink as an emissary. He convinced wagon trains to come over the Emigrant Pass route with "tales" of it being a better and faster route than those in use to the north.

The Emigrant Pass route was shorter by many miles and the ascent of the eastern slope was not difficult; however, the western descent was treacherous. The trails were poorly marked and often little better than rough tracks. The route also took far longer than the northern trails that caused the travelers to run short of provisions and left many on the verge of starvation. Sickness and harsh weather conditions were also factors to deal with. Several times it was necessary to send to Sonora for aid and eventually the city set up a "relief" station in what is today known as Lower Relief Valley. Provisions were given to those destitute and sold to those who could afford them.

The route, while not bad for pack trains, was terrible for wagons and 1853 saw the last known attempt to cross this route with wagons. In October of 1853, "Major" John Ebbets, a well-known mountain man, Lieutenant Tredwell Moore, engineer, and George H. Goddard, assistant engineer, were hired to search out a possible route for the Pacific Railroad. They followed the Emigrant trail from west to east and on October 19, after following a trail of dead animals and abandoned wagons, Ebbets wrote in his diary:

"... we commenced descending some of the worst mountains imaginable, and afterwards rise several steep and rocky ascents; road strewn with dead cattle, horses, remnants of wagons, etc.; in fact the route is the worst that could possibly be found; it is called the Walker River route and I advise no emigrants to take when others are so preferable are known..." (Stanislaus Interpretive Files, n.d.a.).

The idea of a railroad was eventually abandoned. In April of 1854, "Grizzly" Adams also traveled eastward along the Emigrant trail and reported that:

"...on all sides lay old axle trees and wheels...melancholy evidence of the last season's disasters. There were some complete wagons laying there abandoned. I wondered...what difficulties had induced the owners...on the very threshold of the Promised Land...to leave them to rot and ruin" (Stanislaus Interpretive Files, n.d.a.).

3.4.1.3 POST EMIGRANT USE (CATTLE RANCHING)

People continued to use the Emigrant Wilderness through the late nineteenth century into the present day. In the late 1800s both cattle and sheep were driven into the high country to graze as summer pasture. The practice of seasonal grazing in the high country developed into an annual event, with cattlemen driving their livestock to the same areas year after year. The migration gained volume in the 1870s because of another drought, overstocking, and conflicts between ranchers and farmers in the valley (Alderson, 1987).

In 1865, W.F. Cooper's employees built a summer range cabin at Cooper Meadow, probably selected for its abundance of forage and water, its proximity to other good meadowlands,

and because the cabin site was the only spot he could find that was free from mosquitoes (Grace, 1969). A larger cabin was built in 1875.

Cattle grazing peaked in 1917 on the Stanislaus National Forest (in the Emigrant Primitive Basin in particular) in response to increased demand during World War I at 19,328 head forest wide.

3.4.1.4. CONTEMPORARY NATIVE AMERICAN USE

There are currently no known traditional collection areas within the project boundary. Consultation with the Tuolumne Mewuk Tribe revealed concerns for the protection of traditional plants, if found within the project boundary, in the future.

3.4.1.5. FRED LEIGHTON AND DEVELOPMENT OF THE STREAMFLOW MAINTENANCE DAMS

The sheepherders were probably the first to plant fish in the high mountain lakes and streams to supplement their diet of mutton and beans. Cattlemen often carried fish with them when moving the cows, putting them in small lakes and streams. By the late nineteenth century, hunting and fishing had become the primary leisure and commercial pursuits in the central high Sierra and the State of California was making efforts to extend the ranges of the fish into the higher elevations by making trout available to those who wanted to plant them. Fred Leighton was among those who foresaw the potential for high country fisheries as recreational opportunities in Tuolumne County.

The idea for the construction of small unobtrusive dams as a way to develop fisheries began in 1897, long before actual construction of the first dam commenced. It was in that year while accompanying his uncle Alvah Shaw on a cattle drive in the Emigrant Basin that 18 year old Fred Leighton noticed the large number of trout dying off in the early to late fall due to the streams drying up. In subsequent years, Leighton often hiked and camped in the Emigrant Basin each year noting the decreased streamflow and fish kill in the fall of the year.

In 1919, Leighton and his business partner Bill Burnham obtained a Forest Service special use permit to build a hunting/fishing camp that would become the "base camp" for construction and maintenance of the check dams. The camp, which had been built on the ruins of John Rosassco's high country cattle camp, was christened "Yellowhammer." In the summer of 1920, Leighton chose a small-unnamed lake near Yellowhammer camp to build a small "experimental" rock and sod dam. The idea was to raise the lake depth and provide a habitat in which trout could survive the harsh high country winters. The lake, which he also named Yellowhammer, was then stocked with rainbow trout transported in milk cans from Laurel Lake in Yosemite National Park. Leighton found that the fish survived with the increased water depth created by the dam; however in order to develop a self-sustaining fishery, he had to ensure streamflow throughout the dry times of the year. To accomplish this task Leighton went up the canyon above Yellowhammer Lake to a series of small natural lakes where in 1925 he, Bill Burnham, and some friends built a rock and sod dam with a gate valve across the outlet of a small un-named lake. This dam, through management of the valve and outlet gate, would provide sufficient storage to insure a continuous flow of water into Yellowhammer Lake and by stabilizing the streamflow, would insure natural reproduction in the stream above the lake (Burghduff 1933). This lake was

later named Leighton Lake in his honor. Bolstered by the success of these first dams (Red Can was built in 1921) Leighton began a movement to have similar water storage sites established at strategic points as near to the headwaters of the Cherry Creek tributaries as possible (Supernowitz, 1988).

In 1930, Leighton completed a report entitled "Development Plan for Fish Culture in the Stanislaus National Forest." The report described the Cherry River watershed and detailed the possibilities as to the production of fish life, with a rough estimate of the cost of constructing small check dams to hold back sufficient storage water to prevent the streams from going dry for a short time in the fall of the year (Leighton, 1930). Because of the report, an inspection trip to the Emigrant Basin was made to examine the possibility of creating high country fisheries cheaply. Six individuals joined the inspection, they included: J.R. Hall, Forest Supervisor; J.A. Cary, Forest Ranger; A.E. Burgdoff, Division of Fish and Game; Harry Cole, Division of Fish and Game; Frank Kurtzi, Packer from Kennedy Meadows; F.W. Leighton, Merchant, Sonora, CA.

The inspection trip proved a great success and provided the means for Leighton to promote the construction and financing of dams within the Cherry Creek watershed. Through his lobbying efforts Leighton was able to secure funding and cooperation from Tuolumne County Fish and Game (Tuolumne County Sportsmen), State Division of Fish and Game, Tuolumne County Board of Supervisors, the City and County of San Francisco and the United States Forest Service.

With funding and support secured, the first phase of streamflow maintenance dam construction began in earnest. By the end of 1931, five additional dams within the Cherry Creek watershed had been constructed. These dams were located at Emigrant Lake, Bigelow Lake, Long Lake, Emigrant Meadow Lake, and Lower Buck Lake.

Between 1933 -1951, a second phase of eleven additional dams were constructed by the Civilian Conservation Corps (CCC), Forest Service, State and local groups within the Cherry Creek, Lily Creek and Stanislaus River watersheds.

As the success of the water conservation, fisheries development, and outdoor recreation idea spread, forests to the north and south of the Stanislaus also built these small streamflow maintenance dams.

In subsequent years, Fred Leighton was often recognized in state and national publications such as *National Sportsman* and *California Magazine of the Pacific* for the success of the fisheries and the recreational opportunities created by the construction of the dams. In 1964, perhaps the most telling of this recognition came in the form of a scheduled visit by then Governor Edmund G. Brown and other state officials to view Yellowhammer Camp and several of the small dams. However, a few days before the scheduled visit, the Governor injured his ankle and was unable to make the trip but, members of the Governor's staff and other state officials made the trip. The fact-finding trip was a great success and resulted in additional funding to help maintain the dams.

Though Fred Leighton continued in his activism over the years to have more dams built in the Emigrant, proposals to build check dams at such locations as Lunch Meadow, the site of the old Big Dam above Pinecrest Lake, Upper Buck Lake, and Mosquito Pass Meadow did not come to fruition.

It is unknown how many streamflow augmentation dams were built throughout the central Sierra and California, but the idea whose beginnings started in the Emigrant Primitive Basin, helped set the stage for early fish habitat improvement and streamflow management in California.

3.4.2. The National Historic Preservation Act

In 1966, Congress enacted the National Historic Preservation Act (NHPA). The NHPA was designed to protect and encourage the preservation of prehistoric and historic resources for present and future generations¹. This legislation created the National Register of Historic Places (NRHP). The purpose of the register is to maintain a list or inventory of districts, sites, buildings structures, and objects found to be significant on a national, state, or local level in American history, architecture, archaeology, engineering, and culture². Though the Act does not mandate preservation of all historic properties, it does require federal agencies to consider the impact of their actions on historic properties.

3.4.2.1. NATIONAL REGISTER CRITERIA AND DETERMINATION OF ELIGIBILITY

The Emigrant Wilderness Dams EIS project area has had two cultural resource inventories covering 117 acres. Those inventories are documented in Cultural Resource Management Reports Determination of Eligibility for Streamflow Maintenance and Check Dams within the Emigrant Wilderness (Supernowitz, 1988) and the Emigrant Wilderness Plan Amendment/EIS Cultural Resource Evaluation of Eight Historic Structures (DeHart, 1998). Within the 300' diameter project boundary surrounding each of the 18 dams, there are 19 cultural resource sites. Of the 19 sites, 18 are historic dams constructed between the 1920s and 1950s and one is an unrecorded prehistoric bedrock mortar site adjacent to Horse Meadow Dam.

Within these two reports, all 18 dams were evaluated for eligibility against the NHPA criteria (See Appendix B). The results of this evaluation found 7 of the 18 dams were determined significant and eligible for listing on the NRHP.

Table 3-18 Builder, Purpose, and National Register Status

Site	Year Built	Builder	Original Purpose	National Register Status
Yellowhammer	1920	F.W. Leighton B. Burnham	Lake Level	Not Eligible
Red Can	1921	F.W. Leighton B. Burnham	Lake Level	Eligible
Leighton	1925	F.W. Leighton B. Burnham and partners	Streamflow Maintenance	Eligible
Emigrant	1931	F.W. Leighton and partners	Streamflow Maintenance	Eligible
Bigelow	1931	F.W. Leighton and partners	Streamflow Maintenance	Eligible

¹ Public Law 89-665; 16 USC 470 et seq., as amended

² Public Law 89-665; 16 USC 470, Title I, Section 101

Site	Year Built	Builder	Original Purpose	National Register Status
Long	1931	F.W. Leighton and partners	Streamflow Maintenance	Eligible
Emigrant Meadow	1931	F.W. Leighton and partners	Streamflow Maintenance	Eligible
Lower Buck	1931	F.W. Leighton and partners	Streamflow Maintenance	Eligible
Bear	1933	CCC	Streamflow Maintenance	Not Eligible
Y-Meadow	1933	CCC	Streamflow Maintenance	Not Eligible
Huckleberry	1934	CCC	Streamflow Maintenance	Not Eligible
Horse Meadow	1934	CCC	Meadow Maintenance	Not Eligible
Cow Meadow	1934	Forest Service CCC	Lake Level	Not Eligible
Snow Lake	1934	CCC	Streamflow Maintenance	Not Eligible
Cooper Meadow	1940	CCC	Meadow Maintenance	Not Eligible
Whitesides Meadow	1941	CCC	Meadow Maintenance	Not Eligible
Middle Emigrant	1951	Forest Service CDFG	Streamflow Maintenance	Not Eligible
High Emigrant	1951	Forest Service CDFG	Streamflow Maintenance	Not Eligible

3.4.3. Historic Values of the Dams

In the previous section, the results of the evaluation of 18 streamflow dams found seven dams eligible for inclusion to the NRHP. In the 1998 Emigrant Wilderness Management Plan EIS, an additional strategy was applied to those seven dams to measure their compatibility within the wilderness setting based on a point value system. Although this strategy has no bearing on the determination of eligibility results, the exercise further demonstrated the significant historic value of the seven eligible dams (Emigrant Wilderness Management Plan, 1998). The following summarizes those findings.

Table 3-19 Historic Value of Dams Eligible for National Register

Structure	Integrity (75 pts)	Architecture (50 pts)	History (75 pts)	Total (200 pts)	Value
Red Can Lake Dam	75	40	66	181	High
Leighton Lake Dam	75	40	66	181	High
Emigrant Lake Dam	70	40	66	176	High
Bigelow Lake Dam	70	40	66	176	High
Long Lake Dam	75	40	66	181	High
Emigrant Meadow Dam	70	40	66	176	High
Lower Buck Lake Dam	75	40	66	181	High
Historic Value Rating 91%-100% (182 – 200 points) = Very High 81% - 90% (162 – 181 points) = High 70% - 79% (142 – 161 points) = Low < 70% (Less than 142 points) = Very Low					

3.4.4. Existing Structural Condition

During August 2001 and September 2002, 16 dams in the Emigrant Wilderness were inspected in accordance with FS Manual Direction 7516. The two remaining dams were last inspected in 1987 and 1993. The primary goals of the inspections are to identify immediate safety concerns, maintenance needs, and overall existing structural condition (Wisehart 2003). Based on these findings, the following is a list of the current structural integrity condition of NRHP dams. Because the remaining eleven dams were determined not eligible to the NRHP, they are not considered a "historic property" and, therefore; are not afforded further regulatory protections under NHPA.

3.4.4.1. BIGELOW LAKE DAM (CIRCA 1931) ELIGIBLE

Based on the 2002 findings, the dam retains its structural integrity and all of the values that made it eligible to the NRHP; however, there is a need for maintenance work to repair or replace missing rockwork due to possible vandalism. Replacement of the valve works, though not necessary for it to retain eligibility, is necessary for it to retain operational function.

3.4.4.2. LEIGHTON LAKE DAM (CIRCA 1925) ELIGIBLE

Based on the 2002 findings, the dam retains its structural integrity and all the values that made it eligible to the NRHP; however, immediate maintenance and repair work is needed. Severe erosion has weakened the earthen embankment and rocks along the top face of the dam have slumped into the reservoir. Replacement of the valve works, though not necessary for it to retain eligibility, is necessary for it to retain operational function.

3.4.4.3. RED CAN LAKE DAM (CIRCA 1925) ELIGIBLE

Based on the 2002 findings, the dam is in excellent condition and retains its structural integrity and all of the values that made it eligible to the NRHP. There is no need for maintenance or repair work at this time.

3.4.4.4. EMIGRANT LAKE DAM (CIRCA 1931) ELIGIBLE

Based on the 2002 findings, the dam retains its structural integrity and all the values that made it eligible to the NRHP. There are some missing rocks along the top and minor seepage. Minimal repair and maintenance is needed to retain structural integrity. Replacement of the valve works, though not necessary for it to retain eligibility, is necessary in order to retain operational function.

3.4.4.5. EMIGRANT MEADOW LAKE DAM (CIRCA 1931) ELIGIBLE

Based on the 2002 findings, the dam retains its structural integrity and all the values that made it eligible to the NRHP. The report notes some minor seepage. Minimal maintenance is needed to control the seepage and retain structural integrity. Replacement of the valve works, though not necessary for it to retain eligibility, is necessary in order to retain operational function.

3.4.4.6. LONG LAKE DAM (CIRCA 1931) ELIGIBLE

Based on the 2002 findings, the dam retains its structural integrity and all the values that made it eligible to the NRHP. The report notes minor seepage and some missing rocks around the valve well. Minimal repair and maintenance is needed to retain structural integrity.

3.4.4.7. LOWER BUCK LAKE DAM (CIRCA 1931) ELIGIBLE

Based on the 2002 findings, the dam retains its structural integrity and all the values that made it eligible to the NRHP. Some maintenance is needed to address the minor seepage occurring along the dam face. Replacement of the valve works, though not necessary for it to retain eligibility, is necessary in order to retain operational function.

3.4.5. Effects to Heritage Resources

3.4.5.1. ALTERNATIVE 1 – PROPOSED ALTERNATIVE

3.4.5.1.1. Direct and Indirect Effects

Of the 12 dams proposed for repair and maintenance in this alternative, 6 have been determined eligible for listing in the NRHP. Repair and maintenance of these six dams would protect the structural integrity of the dams and preserve the historic legacy of Fred Leighton and his contributions to local and state history. Through the evaluation process, it was found that these 6 dams in the Emigrant Wilderness and beyond best exemplify Leighton's original work as designer, builder, and promoter of outdoor recreation and the lake level and streamflow management concept.

Retention and maintenance of these six examples of Leighton's work would also provide future generations with the opportunity to conduct on-site research and learn firsthand of this unique part of state and local history. While photo documentation and data recovery is an acceptable practice in lieu of preservation, this type of archival research would be limiting.

Of the six dams proposed for non-maintenance in this alternative, one has been determined eligible for listing in the NRHP. The non-maintenance of Red Can Lake dam would be considered an Adverse Effect under 36 CFR 800.5. An Adverse Effect is an action or inaction that causes a (historic/prehistoric) property to lose those characteristics that qualify it for inclusion to the NRHP. Consultation and development of mitigation measures in a Memorandum of Agreement (MOA), prior to releasing this property from management, would have to be negotiated between the State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP), and the Forest Service.

The loss of Red Can Lake dam through natural deterioration would limit opportunities for on-site research and educational opportunities regarding the evolution of fish habitat improvement and of wilderness management. This experimental dam, constructed by Leighton in 1921, is the only remaining example of his earliest development of the habitat improvement idea. It is also the only remaining example of the valve-less, rock and sod construction style. Currently, Red Can Lake dam is in good condition and is expected to remain in place for approximately 10 years.

The long-term effect of non-maintenance and natural deterioration of Red Can Lake dam would be the irreversible loss of a representative example of Fred Leighton's contributions to early fisheries improvements.

The effects of the proposed repair and maintenance of these six dams, when done "in kind"¹ would be in keeping with the Secretary of the Interior's Standards for Treatment of Historic Properties (36 CFR 68) and would not effect the integrity or values that made the structures eligible for listing in the NRHP.

From the standpoint of the NHPA, there would be no effect to historic values of the 11 dams previously determined ineligible to the NRHP. Because they are not eligible, they are not considered a "historic property" and, therefore; are not afforded further regulatory protections under section 106 of the NHPA. The age of the dams was only one aspect of the eligibility process. Although all of the dams are over 50 years old, only those dams with a direct association to Fred Leighton were determined significant for inclusion on the NRHP. From the standpoint of the NRHP, there would be no effect to historic values on the 11 dams previously determined not eligible for listing on the NRHP.

3.4.5.1.2. Cumulative Effects

There are no cumulative effects, as past and reasonably foreseeable future actions do not add or subtract from the direct and indirect effects described in Section 3.4.5.1.1.

3.4.5.2. ALTERNATIVE 2 – NO ACTION

3.4.5.2.1. Direct and Indirect Effects

Non-maintenance and natural deterioration of the seven NRHP eligible dams would be considered an Adverse Effect under 36 CFR 800.5. An Adverse Effect is an action or inaction that causes a property to lose those characteristics that qualify it for inclusion to the National Register of Historic Places. Consultation and development of mitigation measures in an MOA, prior to releasing this property from management, would be negotiated between SHPO, ACHP, and the Forest Service.

Future on-site research and educational opportunities to study fully preserved and functioning dams would be lost through the deterioration of these dams over time. It should be noted that deterioration is expected to occur gradually (500-1000 years) and some structural elements of the dams would remain for future on-site research and education.

The long-term effect of non-maintenance and natural deterioration of the seven NRHP eligible dams would be the irreversible loss of representative examples of Fred Leighton's contributions to early fisheries improvements.

From the standpoint of the NHPA, there would be no effect to historic values of the 11 dams previously determined ineligible to the NRHP. Because they are not eligible, they are not considered a "historic property" and, therefore; are not afforded further regulatory protections under section 106 of the NHPA. The age of the dams was only one aspect of the eligibility process. Although all of the dams are over 50 years old, only those dams with a direct association to Fred Leighton were determined significant for inclusion on the NRHP.

¹ Using materials the same or similar to the existing structure.

From the standpoint of the NRHP, there would be no effect to historic values on the 11 dams previously determined not eligible for listing on the NRHP.

3.4.5.2.2. Cumulative Effects

There are no cumulative effects, as past and reasonably foreseeable future actions do not add or subtract from the direct and indirect effects described in Section 3.4.5.2.1.

3.4.5.3. ALTERNATIVE 3 – HERITAGE

3.4.5.3.1. Direct and Indirect Effects

Repair and maintenance of these seven dams would protect the structural integrity of the dams and preserve the historic legacy of Fred Leighton and his contributions to local and state history.

Retention of these seven examples of Leighton's work would also provide future generations with the opportunity to conduct on-site research and learn firsthand of this unique part of state and local history.

The effects of the proposed repair and maintenance of these seven dams, when done "in kind"¹ would be in keeping with the Secretary of the Interior's Standards for Treatment of Historic Properties (36 CFR 68) and would not effect the integrity or values that made the structures eligible for listing in the NRHP.

From the standpoint of the NHPA, there would be no effect to historic values of the 11 dams previously determined ineligible to the NRHP. Because they are not eligible, they are not considered a "historic property" and, therefore; are not afforded further regulatory protections under section 106 of the NHPA. The age of the dams was only one aspect of the eligibility process. Although all of the dams are over 50 years old, only those dams with a direct association to Fred Leighton were determined significant for inclusion on the NRHP. From the standpoint of the NRHP, there would be no effect to historic values on the 11 dams previously determined not eligible for listing on the NRHP.

Cumulative Effects

There are no cumulative effects, as past and reasonably foreseeable future actions do not add or subtract from the direct and indirect effects described in Section 3.4.5.3.1.

3.5. WILD AND SCENIC RIVERS

3.5.1. Background and Location

Congress passed the *Wild and Scenic Rivers Act* in 1968 to preserve certain free-flowing rivers as a way of balancing the need to dam and otherwise develop other rivers.² As part of

¹ Using materials the same or similar to the existing structure.

² The Act states: *It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be*

the Act, federal agencies are required to inventory rivers within their jurisdictions to see if any would be potential candidates for Wild and Scenic designation. Such designation:

- Restricts construction of dams or other water development projects on protected portions of the river, and
- Requires that land managers protect the specific values for which the river was designated.

A Nationwide Rivers Inventory (NRI) completed in 1982 listed the Clavey River as a potential Wild and Scenic river. However, additional study was required to determine the river's final disposition under the Act.

The Wild and Scenic River Study (River Study) contained in the Environmental Impact Statement (EIS) to the Stanislaus National Forest Land and Resource Management Plan (Forest Plan) documents the eligibility of the Clavey River, including the tributaries of Bell and Lily Creeks, for Wild and Scenic River designation (USDA 1991). The Record of Decision for the Forest Plan found the river eligible but unsuitable¹ for designation. Through the Forest Service appeal process, the Forest Service Chief directed the Pacific Southwest Regional Forester to "review the suitability determination for the Clavey River in light of all new information concerning outstandingly remarkable values and potential uses of the river, and make a new recommendation." A review of information obtained since Forest Plan completion resulted in the Regional Forester's July 25, 1996 determination that the Clavey River and its two tributaries are suitable and recommended for Wild and Scenic River designation.

3.5.1.1. CLAVEY RIVER ATTRIBUTES

The Clavey River (Map 3.7) begins at the confluence of Bell Creek and Lily Creek, approximately 4 miles southeast of Strawberry, California (Strawberry, CA is located on Highway 108 northeast of Sonora, CA) and drains into the Tuolumne River. The headwaters of Lily Creek consist of two forks, the western originating from Chewing Gum Lake and the eastern from Y-Meadow Lake, both within the Emigrant Wilderness. The headwaters of Bell Creek originate approximately 0.5 mile southeast of Burst Rock, also within the Emigrant Wilderness. The western headwaters of Lily Creek are located approximately 1 mile due east of the headwaters of Bell Creek.

The Clavey River is one of the longest remaining free-flowing streams in the Sierra Nevada. It is 47 miles from source to mouth and includes both headwater forks of Bell and Lily Creek. Lily Creek is within the project analysis area. The free-flowing condition is an important value because little remains in the Sierra Nevada. The Clavey River also contains all but one Sierra-Nevada life zone within its watershed. Elevation ranges from 1,200 feet at its mouth to 9,200 feet at its headwaters allowing for all life zones, except true alpine.

The following tables show the Wild and Scenic River values within the Clavey River.

complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes. (Wild and Scenic Rivers Act, section 1(b), P.L. 90-542)

¹ *Eligibility* means a river meets the minimum requirements of being free-flowing and having one or more specific values outlined in the Act; *suitability* is a more subjective determination made by the managing agency based on potential threats to the values, current and projected future use, and other factors.

Table 3-20 Wild and Scenic River Values, Clavey River

1. Ecologic (a) Bell Meadow contains the largest stand of aspen in the Sierra, south of the Eldorado National Forest and, a rich variety of habitats.
2. Ecologic (b) The Clavey River (including Bell and Lily Creeks) has a combination of landscape ecology features making it distinct within the Sierra Nevada.
3. Fish The Clavey may be the only "rainbow trout" river left, in the Sierra Nevada, with its original fish assemblage still intact.
4. Scenic (a) Outstanding Variety Class A landscape at Bell Meadow provides one of the most dramatic displays of seasonal colors in the entire Sierra.
5. Scenic (b) Outstanding Variety Class A landscape includes a deep, V-shaped, river-cut canyon and, a variety of water forms and vegetation patterns.
6. Historic/Cultural Relatively undisturbed section of the 1853 Emigrant Route, used during the early mining period of California.
7. Wildlife Five SOHAs and two fisher reproductive units are located on or adjacent to the river, within 8,000 acres of older mature forest habitat.
8. Recreation Access is limited and portions are remote and wild, resulting in a rare opportunity for solitude and non-motorized recreation experiences.

Table 3-21 Clavey River Wild & Scenic River Values by Segment

#	Segment Description	Length (miles)	Wild & Scenic Values
1	Bell Creek, from its source 0.5 miles southeast of Burst Rock to Lily Creek and the Clavey River	7.0	Ecologic (a) Ecologic (b) Scenic (a) Historic/Cultural
2	Lily Creek, from its sources at Chewing Gum Lake and Y-Meadow Lake to Bell Creek and the Clavey	11.0	Ecologic (b)
3	Clavey River, from Bell Creek and Lily Creek to 3N01	5.0	Ecologic (b) Fish
4	Clavey River, from 3N01 to Cottonwood Road	8.0	Ecologic (b) Fish, Wildlife
5	Clavey River, from Cottonwood Road to the Tuolumne River	16.0	Ecologic (b) Fish, Wildlife Scenic (b) Recreation

3.5.2. Affected Environment

Lily Creek, which is Segment 2 of the proposed Clavey Wild and Scenic River, is the water source for Bear Lake and is classified as "wild."¹ It has the following ecologic outstandingly remarkable values:

- Free-flowing characteristics
- Abundance and quality of life zones and vegetation
- Elevation range
- Relative remoteness and lack of development

A five mile segment of the main Clavey, which is Segment 3 of the proposed Clavey Wild and Scenic River, located directly below the confluence of Bell and Lily creeks, is classified as "scenic"² with fish and ecologic being the outstandingly remarkable values. The main Clavey is also a State of California designated Wild Trout Stream.

The main Clavey is also a State of California designated Wild Trout Stream. A Wild Trout Stream provides self-sustaining trout fisheries that are not supplemented by hatchery stocking. It is believed that almost the entire basin (95%) contains only fish "native" (Rainbow Trout) to this portion of the Sierra Nevada.

The portions of Lily Creek that are located above Y-Meadow dam are not eligible or suitable for Wild and Scenic River designation. However, Lily Creek is the water source for Y-Meadow. Whether an action would affect Lily Creek and threaten the eligibility and suitability of the Clavey has been evaluated in this document.

3.5.3. Effects to the Clavey Wild and Scenic River

To determine the effects that actions may have to the Wild and Scenic Rivers resource, those attributes which made the Clavey River eligible and suitable for Wild and Scenic River status have been considered.

The cumulative effects area for Wild and Scenic is Lily Creek, the headwaters for the Clavey River. The past project considered is dam maintenance. Dam maintenance is also the reasonably foreseeable future action. Fish stocking, which has been considered in other parts of this analysis, would not occur at Bear Lake because of the wild trout fishery located below it. Likewise, Y-Meadow, a fishless lake, would not be stocked.

¹ Wild is defined as "free of impoundments; vestiges of primitive America with little or no evidence of human activity, and generally inaccessible except by trail with no roads, railroads, or provisions for vehicular travel" (1991, Stanislaus National Forest, Wild and Scenic Study, p. 28)

² Scenic is defined as "free of impoundments; largely primitive and undeveloped with no substantial evidence of human activity; and, accessible in places by roads which may occasionally reach or bridge the river" (1991, Stanislaus National Forest, Wild and Scenic Study, p.28)

3.5.3.1. ALTERNATIVE 1 – PROPOSED ACTION

3.5.3.1.1. Direct and Indirect Effects

Lily Creek Watershed

Y-Meadow

Free Flowing Characteristics

Y-Meadow Dam would be repaired and maintained in Alternative 1. Maintenance of the dam would indirectly affect Segment 2 of Lily Creek by continuing to store water and hinder the free flowing characteristics of Lily Creek by altering the quantity and timing of flow downstream from the dam. Eventually, the capacity of the dam may be reduced enough so that it would no longer be able to effectively regulate downstream flows (for maintaining a downstream fishery) (Soils and Watershed Report XXXX).

Ecology – Stream Habitat

There would be no direct effects to these stream bank species in this alternative because there is no suitable habitat in the areas that would be affected by dam maintenance activities. The primary possible effect would be the indirect effect of erosion or excessive scour of streambank and adjacent flood plain if a dam fails while it is retaining water. This alternative minimizes that possibility by maintaining the dams that impound the most water. In addition, management direction provides for removal if there is a safety concern (USDA Forest Service, 2002). The potential failure of a dam while retaining water could be a safety concern.

An additional indirect effect would be from the introduction of noxious weeds. The likelihood of this is very low due to management requirements for the use of weed free feed and for cleaning equipment. Of the most likely noxious weeds that could be introduced into the wilderness (Appendix C – Noxious Weed Risk Assessment), whitetop (*Cardaria pubescens*), Canada thistle (*Cirsium arvense*), and ox-eye daisy (*Leucanthemum vulgare*) can grow along streams and could affect this habitat the most.

Ecology – Meadow Habitat

In most cases, meadows would be avoided during dam repair. There could be some impacts from stock animals, but these would meet the standards established for cattle allotments. These standards are intended to reduce impacts. Impacts in a particular area would generally occur during a single season. As mentioned above, the spread of weeds has been mitigated.

Ecology - Large Rocks (*Orthotrichum spjutii*)

Orthotrichum spjutii occurs on large rocks or rock outcrops. This habitat has been protected by a management requirement that would prevent breaking up large boulders or rock faces to use as a source for smaller rocks; therefore, there would be no direct or indirect effects to *Orthotrichum spjutii*.

Ecology – Slopes with Rocks

These species could be affected by rock collection for dam reconstruction and repair. However, there is a management requirement to prohibit collection of rocks in the areas with metamorphic rocks to protect the most likely suitable plant habitat. For more information, refer to the Botany section of this document.

Most of the suitable plant habitat for these species has been protected through management requirements. All of these species occur primarily either to the north or the south of the forest and are less likely in the analysis area because it is at the limit of their ranges. Rock collection would only affect a small portion of the suitable habitat in the project area as close to the dams as possible. Any species that is present in those locations has survived a greater impact in the past when the dams were constructed or has been able to recolonize afterwards. This action is unlikely to affect the viability of any occurrences (Botany, Section 3.9).

Elevational Range, Remoteness, and the Lack of Developments

There would be no indirect effect to elevational range and relative remoteness. However, maintenance and reconstruction of the dam would continue the presence of human development above Segment 2.

Fisheries

Water seepage and release from Y-Meadow dam helps to support stream dwelling trout between the dam and Bear Lake. Repair and operation of the water valve would enable more of the stored water to be released during dry periods. A direct effect of increased discharge would likely be increased availability of zooplankton in the aquatic drift as potential prey organisms for fish. Maintenance and operation of Y-meadow dam could result in indirect effects associated with increased release of water during the summer and fall. The increased discharge could reduce maximum summer water temperatures and increase the dissolved oxygen content of water. The wetted area available to fish for rearing would increase. The net effect of the changes from the current status would be sustained or increased fish survival and growth. For more information, refer to Fisheries, Section 3.8.

Bear Lake

Bear Lake would not be repaired or maintained in this alternative and gradual deterioration would occur within 20 years (Wisehart, 2003).

Free Flowing Characteristics

Indirectly, the deterioration of the dam would enhance the free flowing characteristics of Lily Creek from Y-Meadow downstream to its confluence with Bell Creek. However, hydrologic connectivity within Lily Creek would be only partially restored because of the breaching of Bear Lake dam. Retention of Y-Meadow Lake dam would continue to alter the natural flow regime within the watershed by altering the quantity and timing of flow downstream from the dam. See Watershed, Section 3.1.

Ecology- Stream Habitat

There would be no direct effects to these stream bank species in this alternative because there is no suitable habitat in the areas that would be affected by dam maintenance activities. The primary possible effect would be the indirect effect of erosion or excessive scour of streambank and adjacent flood plain if a dam fails while it is retaining water. This alternative minimizes that possibility by maintaining the dams that impound the most water. In addition, management direction provides for removal if there is a safety concern (USDA Forest Service, 2002). The potential failure of a dam while retaining water could be a safety concern.

An additional indirect effect would be from the introduction of noxious weeds. The likelihood of this is very low due to management requirements for the use of weed free feed and for cleaning equipment. Of the most likely noxious weeds that could be introduced into the wilderness (Appendix C – Noxious Weed Risk Assessment), whitetop (*Cardaria pubescens*), Canada thistle (*Cirsium arvense*), and ox-eye daisy (*Leucanthemum vulgare*) can grow along streams and could affect this habitat the most.

Ecology – Meadow Habitat

In most cases, meadows would be avoided during dam repair. There could be some impacts from stock animals, but these would meet the standards established for cattle allotments. These standards are intended to reduce impacts. Impacts in a particular area would generally occur during a single season. As mentioned above, the spread of weeds has been mitigated.

Ecology - Large Rocks (*Orthotrichum spjutii*)

The dam would not be maintained; therefore, there would be no direct or indirect effects to this species.

Ecology – Slopes with Rocks

These species could be affected by rock collection for dam reconstruction and repair. There is a management requirement to prohibit collection of rocks in the areas with metamorphic rocks to protect the most likely suitable plant habitat. At Bear Lake, which has the most likely habitat for *Hulsea brevifolia*, the dam is not proposed for maintenance (See Botany, Section 3.9 for more information).

Most of the suitable plant habitat for these species has been protected through management requirements. All of these species occur primarily either to the north or the south of the forest and are less likely in the analysis area because it is at the limit of their ranges. Rock collection would only affect a small portion of the suitable habitat in the project area as close to the dams as possible. Any species that is present in those locations has survived a greater impact in the past when the dams were constructed or has been able to recolonize afterwards. This action is unlikely to affect the viability of any occurrences (Botany, Section 3.9).

Elevational Range, Remoteness, and Lack of Developments

There would be no indirect effect to elevational range and relative remoteness. However, deterioration of the dam would indirectly support the lack of development attribute of Lily Creek.

Fisheries

Under this alternative, the Bear Lake impoundment would not be maintained. The dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. This would result in the loss of 6 acres of lake rearing habitat (24%), and 10' of depth (20%). Some stream habitat may be added as the lake recedes into its basin (Fisheries, Section 3.8).

Scenery

Under this alternative, the Bear Lake impoundment would not be maintained. The dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. Scenic condition may reduce as the volume of the lake reduces.

As the dam deteriorates, it would become more unnoticeable in most areas meeting the criterion for water developments in the Emigrant Wilderness. Bear Lake is in opportunity class IV and the imprint of human influences should be substantially unnoticeable. Continued deterioration and progression toward natural appearing would move this structure in that direction but the standing ruins would remain for hundreds of years (200-500 years, engineers estimate). The rock faces marked with the horizontal mineral deposit typical of lakes in the Emigrant Wilderness would always be there (Visuals, Section 3.3.)

3.5.3.1.2. Cumulative Effects

There are no anticipated direct effects to stream habitat from this alternative. Indirect effects have been mitigated so that they also would not affect these species. Regarding meadow habitat, this alternative would have a net negative effect on 15 acres of meadow and riparian habitat. Most of these impacts would occur in areas that have been subject to impact when the dams were constructed and had been inundated until the late 1990's. All other planned activities that could impact meadows, primarily trail work, have been mitigated through the use of or planned use of surveys before the action. One other known effect to meadows is the dewatering process that has occurred when downcutting from a head cut drops the water table until it is no longer suitable for the sensitive plants and many other meadow species. This process has affected and is probably continuing to affect other wet meadows in the Emigrant Wilderness. Overall, this project is confining impacts to areas where impacts have occurred in the past. This alternative is affecting less than 1% of the total meadow area within the elevation range of the project in the Emigrant wilderness. (See Botany, Section 3.9 for more information). There would be no cumulative effects to large rocks. With regards to slopes with rocks,

this alternative could have short-term effects to *Arabis tiehmii*. It is not likely to affect the viability of any occurrence that may be here, and therefore would not add to cumulative effects. The most suitable habitat for *Draba asterophora* var. *asterophora* and *Hulsea brevifolia* would not be affected by this alternative and so there would be no direct or indirect effects to those species.

Fisheries

During dry years, the Y-meadow impoundment may contribute all the flow to the headwaters of Lily Creek above the confluence with the Granite Lake tributary. The influence of Y-Meadow on flows to Bear Lake and its rainbow and brook trout, and the combined storage potential of Y-Meadow and Bear Lake are important to maintaining trout spawning in upper Lily Creek during dry years. Only a portion of the impounded volume is currently being used, so there is potential to increase stream carrying capacity, spawning success and egg to fry survival.

Summary

Cumulatively, Alternative 1, which would manage and maintain Y-Meadow, would not threaten the wild and scenic attributes and eligibility of Lily Creek. The dams were present when the evaluation was completed on the Clavey River. The complete deterioration of the Bear Lake dams (200 to 500 years) would reduce the evidence of human development and enhance the free-flowing characteristics of Lily Creek. Although Alternative 1 does not support the wild and scenic attributes as much as Alternatives 2 and 3, it is not foreseen that the persistence of Y-Meadow Dam would, in the long term, affect the status of Lily Creek.

3.5.3.1.3. Other Potential Effects

Refer to Soils, Watershed, Wildlife, Recreation, Visuals, Fisheries, Botany, Wilderness, and Socio-Economic Sections for the effects to other Wilderness processes and resources.

3.5.3.2. ALTERNATIVE 2 – NO ACTION

3.5.3.2.1. Direct and Indirect Effects

Lily Creek Watershed

Y-Meadow

Free Flowing Characteristics

Y-Meadow Dam would not be repaired and maintained in Alternative 2. As the dams deteriorate, the natural hydrologic function (water yield and timing of yield) and sediment transport processes within the Clavey River Watershed would gradually revert to near pre-dam conditions. Hydrologic connectivity may never fully be recovered without human intervention at Y-Meadow dam due to the remnants of the dam (i.e., boulders) remaining in the drainage for an indefinite period after the dam has deteriorated, effectively blocking the upstream and downstream movement of aquatic species. The gradual deterioration of the dam would indirectly affect Lily Creek by releasing water. The return to natural conditions would support the free flowing characteristics found in this segment (See Watershed, Section 3.1).

Ecology – Stream Habitat

In this alternative, as the dams failed, the flow regimes would change. There could be higher peak flows and less of a sustained flow over the course of the summer. Two of the known occurrences of *Bruchia bolanderi* are on unregulated streams where they are subject to periodic flooding. It is unknown how many of the occurrences of these species on other forests are affected by dams. In this alternative, occurrences that are established below

dams could be negatively affected in the short term by flow changes. Since the known occurrences are in areas above any dams, it is possible that this alternative would create more suitable habitat in the long term.

Additionally, more acres of meadow could be recreated in this alternative as the dams cease to function. Since *Bruchia bolanderi* usually grows on stream banks in meadows, this would create additional possible habitat. In both of these cases, the degree of occupancy of this habitat would depend on the ability of *Bruchia bolanderi* to spread to those sites. This would affect the botrychiums less since they occur in other types of streamside habitat also.

Ecology – Meadow Habitat

Under this alternative there would be no direct effects. The primary indirect effect would be due to the changes in flow patterns as the dams cease to function. This could occur slowly over time or quickly. At Y-Meadow, the materials from the dam could form a check dam. Over the long term, this alternative is likely to recreate up to a total of 156 acres of meadow and riparian habitat. This would lead to an increase in suitable habitat. Whether that habitat becomes occupied would depend on the proximity of sensitive plants in the area.

Ecology - Large Rocks (*Orthotrichum spjutii*)

No dam repair or reconstruction would occur in this alternative. There would be no direct or indirect effects to *Orthotrichum spjutii* in this alternative.

Ecology – Slopes with Rocks

Since rocks would not be collected in this alternative, there would be no direct or indirect effects to these three species.

Elevational Range, Remoteness, and Lack of Developments

There would be no direct or indirect effects to elevational range and relative remoteness. However, the deterioration of the dam would eventually remove evidence of human development. This would indirectly support the “lack of development” attribute of Lily Creek.

Fisheries

Y-Meadow dam contains rock too large to be mobilized by the stream and will likely persist in some form indefinitely even without maintenance. As the top of the dam deteriorates, less water would be stored and released through seepage. The volume of water stored will gradually decline as sediment accumulates behind the dam or its remnant. During dry years, downstream fish would be confined to deep pools for survival. If there were several successive years of drought and fish were not able to spawn, trout could be lost to the upper Lily Creek.

Decreased discharge could increase maximum summer water temperatures and decrease the dissolved oxygen content of water. The area flooded and available to fish for rearing would decrease. The net effect of the changes from the current status would be decreased fish survival and growth.

The dam has trapped an unknown quantity of granite sands and other sediment. A sudden breach or gradual lowering of the dam to the elevation of stored sediment could result in mobilization of that substrate as suspended sediment or bed load. The stream channel would get wider and shallower as the bed material moved downstream. Pools would fill with substrate and riffles would become covered with fine-grained substrate. Over time, the material would move downstream and deposit into Bear Lake. In addition to the temporary loss of rearing and spawning habitat in Lily Creek, the interstitial spaces of substrate would be filled and cover habitat for aquatic invertebrates. Bear Lake would lose some volume, and species requiring clean gravel and constant flow may temporarily decline until the stream transports the accumulated material.

Bear Lake

Free Flowing Characteristics

Bear Lake would not be repaired or maintained in this alternative and gradual deterioration would occur within 20 years (2003, Wisehart).

Indirectly, the deterioration of the dam would enhance the free flowing characteristics of Lily Creek. As the dams deteriorate, the natural hydrologic function (water yield and timing of yield) and sediment transport processes within the Clavey River watershed would gradually revert to near pre-dam conditions. However, hydrologic connectivity may never fully be recovered without human intervention at Y-Meadow dam. Remnants of the dam (i.e., boulders) remaining in the drainage for an indefinite period, after the dam has deteriorated, effectively block the upstream and downstream movement of aquatic species (See Watershed, Section 3.1).

Ecology – Stream Habitat

In this alternative, as the dams failed, the flow regimes would change. There could be higher peak flows and less of a sustained flow over the course of the summer. Two of the known occurrences of *Bruchia bolanderi* are on unregulated streams where they are subject to periodic flooding. It is unknown how many of the occurrences of these species on other forests are affected by dams. In this alternative, occurrences that are established below dams could be negatively affected in the short term by flow changes. Since the known occurrences are in areas above any dams, it is possible that this alternative would create more suitable habitat in the long term.

Additionally, more acres of meadow could be recreated in this alternative as the dams cease to function. Since *Bruchia bolanderi* usually grows on stream banks in meadows, this would create additional possible habitat. In both of these cases, the degree of occupancy of this habitat would depend on the ability of *Bruchia bolanderi* to spread to those sites. This would affect the botrychiums less since they occur in other types of streamside habitat also.

Ecology – Meadow Habitat

Under this alternative, there would be no direct effects. The primary indirect effect would be due to the changes in flow patterns as the dams cease to function. This could occur slowly over time or quickly. None of the dams would be expected to release a large load of sediment downstream (see watershed effects). In all lakes (except Y-Meadow), the sediment would remain in the natural lake. This would lead to an increase in suitable

habitat. Whether that habitat becomes occupied would depend on the proximity of sensitive plants in the area. That is particularly likely at Bear Lake where there is an unaffected meadow above the affected meadow. Some meadow habitat may be a drier type due to the accumulation of sediments while inundated. These changes would take place over 10 to 100 years (Wisehart, 2003).

Ecology - Large Rocks (*Orthotrichum spjutii*)

No dam repair or reconstruction would occur in this alternative. There would be no direct or indirect effects to *Orthotrichum spjutii* in this alternative.

Ecology – Slopes with Rocks

Since rocks would not be collected in this alternative, there would be no direct or indirect effects to these three species (Botany, Section 3.9).

Elevational Range, Remoteness, and Lack of Developments

There would be no indirect effect to elevational range and relative remoteness. However, deterioration of the dam would indirectly support the lack of development attribute of Lily Creek.

Fisheries

Under this alternative, the dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. This would result in the loss of 6 acres of lake rearing habitat. Some stream habitat may be added as the lake recedes into its basin, and as sediment stored in Y-Meadow is deposited onto Bear Lake's inlet delta.

Scenery

Under this alternative, the Bear Lake impoundment would not be maintained. The dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. Scenic condition may reduce as the volume of the lake reduces.

As the dam deteriorates it would become more unnoticeable in most areas meeting the criterion for water developments in the Emigrant Wilderness. Bear Lake is in opportunity class IV and the imprint of human influences should be substantially unnoticeable. Continued deterioration and progression toward natural appearing would move this structure in that direction but the standing ruins would remain for hundreds of years (200-500 years, engineers estimate). The rock faces marked with the horizontal mineral deposit typical of lakes in the Emigrant Wilderness would always be there (Visuals, Section 3.3).

3.5.3.2.2. Cumulative Effects

The short-term effects of this project to stream habitat could be negative. The long-term effect is likely to be positive since more habitat would be created which follows an undammed flow regime. The overall change to cumulative effects would be positive. There are no other known impacts or planned impacts to occurrences of *Bruchia bolanderi* on this forest. Regarding meadow habitat, this alternative would be beneficial and would increase

the area of meadows in the Emigrant Wilderness over time. There are no known negative effects. There would be no cumulative effect to large rocks and slopes with rocks.

Fisheries

Lily Creek (Y-Meadow and Bear Lake): During dry years, the Y-meadow impoundment may contribute all the flow to the headwaters of Lily Creek above the confluence with the Granite Lake tributary. The influence of Y-Meadow on flows to Bear Lake and its rainbow and brook trout, and the combined storage potential of Y-Meadow and Bear Lake are important to maintaining trout spawning in upper Lily Creek during dry years. Only a portion of the impounded volume is currently being used. The change from the existing condition would primarily be the loss of fish immediately below Y-Meadow dam, and reduced spawning or egg to fry survival during dry years.

Summary

Cumulatively, Alternative 2 would support the wild and scenic attributes of Lily Creek and the main Clavey more so than Alternative 1. With the gradual deterioration of both Y-Meadow and Bear Lake dams (it may take 20 years), the evidence of human development would be reduced and the free-flowing characteristics of Lily Creek would be enhanced.

3.5.3.2.3. Other Potential Effects

Refer to Soils, Watershed, Wildlife, Recreation, Visuals, Fisheries, Botany, Wilderness, and Socio-Economic Sections for the effects to other Wilderness processes and resources.

3.5.3.3. ALTERNATIVE 3 – HERITAGE

3.5.3.3.1. Direct and Indirect Effects

Lily Creek Watershed

Y-Meadow

Free Flowing Characteristics

Y-Meadow Dam would not be repaired and maintained in Alternative 2. As the dams deteriorate, the natural hydrologic function (water yield and timing of yield) and sediment transport processes within the Clavey River Watershed would gradually revert to near pre-dam conditions. Hydrologic connectivity may never fully be recovered without human intervention at Y-Meadow dam due to the remnants of the dam (i.e., boulders) remaining in the drainage for an indefinite period after the dam has deteriorated, effectively blocking the upstream and downstream movement of aquatic species. The gradual deterioration of the dam would indirectly affect Lily Creek by releasing water. The return to natural conditions would support the free flowing characteristics found in this segment (Watershed, Section 3.1).

Ecology – Stream Habitat

As in Alternative 1, seven dams that currently retain water would be maintained. Six of the dams that were maintained in Alternative 1 will be allowed to decay. The indirect effects of dam failure and weed introduction would be mitigated in this alternative. This alternative

would result in habitat creation to a lesser extent than Alternative 2. The overall long-term effect would be positive to the extent that the additional suitable habitat is utilized.

Ecology –Meadow Habitat

In this alternative most of the dams that originally flooded meadows would be allowed to deteriorate. A total of 57 acres of meadow and lakeside habitat would be restored. The effects of this alternative are intermediate between Alternatives 1 and 2 and have been mitigated. The overall effect of this alternative would be beneficial by increasing meadow habitat.

Ecology - Large Rocks (*Orthotrichum spjutii*)

Orthotrichum spjutii occurs on large rocks or rock outcrops. This habitat has been protected by a management requirement that would prevent breaking up large boulders or rock faces to use as a source for smaller rocks; therefore, there would be no direct or indirect effects to *Orthotrichum spjutii*.

Ecology – Slopes with Rocks

There are no direct or indirect effects to three species (*Arabis tiehmii*, *Draba asterophora* var. *asterophora*, and *Hulsea brevifolia*) in this alternative (Botany Report XXX).

Elevational Range, Remoteness, and Lack of Development

There would be no indirect effect to elevational range and relative remoteness. However, the deterioration of the dam would eventually remove evidence of human development. This would indirectly support the “lack of development” attribute of Lily Creek.

Fisheries

Under this alternative, Y-Meadow dam would likely persist in some form for many years even without maintenance. Eventually as the top of the dam deteriorated, less water would be stored and released through seepage, and fish would be confined to deep pools for survival. If there were several successive years of drought and fish were not able to spawn, trout could be lost to the upper Lily Creek. Decreased discharge could increase maximum summer water temperatures and decrease the dissolved oxygen content of water. The area flooded and available to fish for rearing would decrease. The net effect of the changes from the current status would be decreased fish survival and growth. The dam has trapped an unknown quantity of granite sands and other sediment. A sudden breach or gradual lowering of the dam to the elevation of stored sediment could result in mobilization of that substrate as suspended sediment or bed load. The stream channel would get wider and shallower as the material moved downstream. Pools would fill with substrate and gravel riffles would get covered with fine grained substrate. Over time, the material would move downstream and get deposited into Bear Lake. In addition to the temporary loss of rearing and spawning habitat in Lily Creek, the interstitial spaces of substrate would be filled and cover habitat for aquatic invertebrates. Bear Lake would lose some volume and species requiring clean gravel and constant flow may temporarily decline until the stream transports the accumulated material (Fisheries Report, XXX).

Bear Lake

Free Flowing Characteristics

Bear Lake would not be repaired or maintained in this alternative and gradual deterioration would occur within 20 years (2003, Wisehart).

Indirectly, the deterioration of the dam would enhance the free flowing characteristics of Lily Creek. As the dams deteriorate, the natural hydrologic function (water yield and timing of yield) and sediment transport processes within the Clavey River watershed would gradually revert to near pre-dam conditions. However, hydrologic connectivity may never fully be recovered without human intervention at Y-Meadow dam. Remnants of the dam (i.e., boulders) remaining in the drainage for an indefinite period, after the dam has deteriorated, effectively block the upstream and downstream movement of aquatic species (Watershed, Section 3.1).

Ecology – Stream Habitat

As in alternative 1, seven dams that currently retain water would be maintained. Six of the dams that were maintained in Alternative 1 will be allowed to decay. The indirect effects of dam failure and weed introduction would be mitigated in this alternative. This alternative would result in habitat creation to a lesser extent than Alternative 2. The overall long-term effect would be positive to the extent that the additional suitable habitat is utilized.

Ecology –Meadow Habitat

The effects are intermediate between Alternatives 1 and 2 and have been mitigated. The overall effect of this alternative would be beneficial by increasing meadow habitat.

Ecology - Large Rocks (*Orthotrichum spjutii*)

No dam repair or reconstruction would occur in this alternative. There would be no direct or indirect effects to *Orthotrichum spjutii* in this alternative.

Ecology – Slopes with Rocks

In this alternative, there would be no affect to these species.

Elevational Range, Remoteness, and Lack of Developments

There would be no indirect effect to elevational range and relative remoteness. However, deterioration of the dam would indirectly support the lack of development attribute of Lily Creek.

Fisheries

Under this alternative, the dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. This would result in the loss of 6 acres of lake rearing habitat. Some stream habitat may be added as the lake recedes into its basin, and as sediment stored in Y-Meadow is deposited onto Bear Lake's inlet delta.

Scenery

Under this alternative, the Bear Lake impoundment would not be maintained. The dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. Scenic condition may reduce as the volume of the lake reduces.

As the dam deteriorates, it would become more unnoticeable in most areas meeting the criterion for water developments in the Emigrant Wilderness. Bear Lake is in opportunity class IV and the imprint of human influences should be substantially unnoticeable. Continued deterioration and progression toward natural appearing would move this structure in that direction but the standing ruins would remain for hundreds of years (200-500 years, engineers estimate). The rock faces marked with the horizontal mineral deposit typical of lakes in the Emigrant Wilderness would always be there (Visuals, Section 3.3).

3.5.3.3.2. Cumulative Effects

Lily Creek Watershed

Ecology

As in Alternative 2, the overall cumulative effects to stream habitat would be positive. For meadow habitat, this alternative would be beneficial and would increase the area of meadows in the Emigrant Wilderness over time. There are no known negative effects. There would be no cumulative effects to large rocks, and slopes with rocks.

Fisheries

Lily Creek (Y-Meadow and Bear Lake): During dry years, the Y-meadow impoundment may contribute all the flow to the headwaters of Lily Creek above the confluence with the Granite Lake tributary. The influence of Y-Meadow on flows to Bear Lake and its rainbow and brook trout, and the combined storage potential of Y-Meadow and Bear Lake are important to maintaining trout spawning in upper Lily Creek during dry years. Only a portion of the impounded volume is currently being used. The change from the existing condition would primarily be the loss of fish immediately below Y-Meadow dam, and reduced spawning or egg to fry survival during dry years.

Lily Creek would be dependent on natural runoff without the release of stored water from Y-Meadow. If Y-Meadow dam deteriorates, short-term increases in sediment and bedload supply, coupled with a reduced transport capacity from reduced flow, could affect portions of Lily Creek with a wider, shallower channel; reduced aquatic invertebrate production; reduced spawning survival; and increased susceptibility to temperature extremes. There is potential for the loss of the fishery in the upper watershed.

Summary

Cumulatively, Alternative 3 would support the wild and scenic attributes of Lily Creek and the main Clavey more so than Alternative 1. Alternative 3 has the same cumulative effects as Alternative 2. With the gradual deterioration of both Y-Meadow and Bear Lake dams, the evidence of human development would be reduced and the free-flowing characteristics of Lily Creek would be enhanced.

5.3.5.3.3. Other Potential Effects

Refer to Soils, Watershed, Wildlife, Recreation, Visuals, Fisheries, Botany, Wilderness, and Socio-Economic Sections for the effects to other Wilderness processes and resources

3.6. RECREATION

3.6.1. Introduction

The 1998 Emigrant Wilderness Environmental Impact Statement and Record of Decision and the 2002 Emigrant Wilderness Management Direction described the existing condition information and current management direction for the recreation resource around the 18 dams in the project area. The management direction for the dams used the Limits of Acceptable Change (LAC) process, which recognizes that conditions will and should vary between and within areas to respond to the needs and desires of the visitors within the context of designated wilderness. Desired conditions for these variations are described by opportunity class. Opportunity classes are zones where different objectives are established and different standards often apply. A more thorough explanation of the LAC process can be found in the 1998 Emigrant Wilderness Management Plan, Appendix C. Table 3-22 describes the four Opportunity Class Desired Condition for recreation (Emigrant Wilderness Management Plan, 1998, pg 22-23).

3.6.2. Existing Condition

Table 3-22 Opportunity Class Desired Conditions for Recreation

	<u>Least Primitive</u>			<u>Most Pristine</u>
	Class IV	Class III	Class II	Class I
Human Environment	The imprint of human influences is <i>substantially unnoticeable</i> . The opportunity for solitude is <i>low to outstanding</i> .	The imprint of human influences is <i>substantially unnoticeable</i> . The opportunity for solitude is moderate to outstanding.	The imprint of human influences is <i>unnoticeable in most areas</i> . The opportunity for solitude is <i>high to outstanding</i> .	The imprint of human influences is <i>unnoticeable</i> . The opportunity for solitude is <i>outstanding</i> .
Recreation	The opportunity for a primitive, unconfined recreation experience is <i>low to outstanding</i>	The opportunity for a primitive, unconfined recreation experience is <i>moderate to outstanding</i> .	The opportunity for a primitive, unconfined recreation experience is <i>high to outstanding</i> .	The opportunity for a primitive, unconfined recreation experience is <i>outstanding</i> .

The number and type of encounters with other visitors greatly influences the quality of the wilderness experience. The number of groups camped within sight and sound has been shown to be the most influential type of encounter for visitors (Emigrant Wilderness Management Plan, 1998, pg 41). The Emigrant Wilderness Management Direction (2003, p. 27) lists the maximum number of groups recommended to camp at each of the 18-

dam/lake areas. Recreation activities, use patterns, and trends in the Emigrant Wilderness are discussed in the Emigrant Wilderness Management Plan EIS and Management Direction. Of the twelve dominant activities listed, camping, fishing, scenic viewing, and swimming relate to the occurrence of dams in conjunction with the lakes and meadows. Of these, fishing and scenic viewing pertain specifically to the dams and their connection to the lake or meadow. Camping may relate slightly to the impounded water, but swimming is not contingent upon any criteria stemming from lakes with dams.

Currently, all of the Emigrant Wilderness is open to travel with stock. Packing with stock is a traditional activity in the Emigrant Wilderness. Sixteen percent of visitors to the Emigrant Wilderness come with stock. Seven of the ten most popular destination sites visited by private and outfitter/guide stock users are associated with lakes that have dams (Emigrant Wilderness Management Plan, 1998, pg 147). Restrictions have been placed on two of the lakes with dams to reduce impacts from stock:

- Overnight stock holding is prohibited within ¼ mile of Bear Lake.
- No more than four animals per group can spend the night within ¼ mile of Long Lake.

These restrictions were imposed to protect the vegetation and soils around these popular destinations. Drift fences constructed to allow for turning stock loose to avoid damage caused when they are tied in one place are at Horse Meadow, Huckleberry Lake, and Cow Meadow Lake.

It is not known how many people go to the Emigrant Wilderness specifically to fish; however, it is thought to be a major attraction for many. Surveys of wilderness visitors (Manfredo, 1978) show that visitors to selected Wildernesses participating in fishing ranged from 34% to 46%, while visitors listing fishing as their most important activity ranged from 10% to 14% (Emigrant Wilderness Management Plan, 1998, p. 150).

The Emigrant lakes, including those with dams, encompass all the important features identified in the Manfredo study. Many of outdoor wilderness internet sites discussing the Emigrant Wilderness include fishing as a significant part of the experience. Peak Adventures (infor@peakadventures.org) state, "...this portion of the trail will be about 20 miles, we will pass many lakes including Gem Lake, Deer Lake, and Emigrant Lake. This means that there will be opportunities to fish along the way" is a typical spin on the expectation. Another researcher observes, "In many wilderness areas, fishing and hunting are the major attractions. Some high alpine lakes are considered "fishing magnets" because of the opportunities they provide (Wingate, 1989). As fishing pressure in non-wilderness areas increases, wilderness areas become increasingly important for quality fishing experiences, making it a virtually wilderness-dependent activity (Knapp, 1996). Over half of the visitors to Montana's wilderness areas fish during their visit. In some wilderness areas nationwide, this figure approaches 90% (Fraley, 1996)."¹

¹ Peel, Stephen, Natural Resources 3495, University of Montana "Case Study: Fish Stocking and Management in Wilderness", 1999.

The history and folklore associated with the system of dams built by Fred Leighton and others is very much a part of local tradition and is an important oral interpretive event. It is often discussed, along with show and tell on pack trips that include trails and camps near any of the dams. Local residents have a variety of beliefs concerning the dams, their construction, their importance to the fisheries and grazing, and the contribution made to the watershed. Regardless of the verity of these beliefs, they are a serious part of community relationship to the Emigrant Wilderness and the experience enjoyed by residents, especially those for whom it is a multigenerational event.

State game laws regulate fishing in the Emigrant Wilderness and the State of California Department of Fish and Game (CDFG) manages all stocking of fish in the lakes with dams. Discussion of the fisheries can be found in Fisheries, Section 3.8. Interagency agreements define guidelines and policies nationally for fish management in Wilderness¹ and numerous policies and regulations provide direction for management of fisheries in freshwater resources in the United States.²

Recreational angling in the lakes and streams associated with the dams varies from non-existent to excellent. However, an important aspect of angling related to the dams is that the intent of these dams was not to augment lake fisheries, but to increase flow downstream to assist juvenile fish to make it back to the lakes for the winter. In some cases, impoundment reduces available spawning habitat by inundating the stream inlet on some of the lakes (as at Emigrant Lake). Ten of the lakes with dams have a moderate contribution to downstream recreation fisheries and two (Emigrant and Emigrant meadow) have a substantial contribution to downstream fisheries.

Tables 3-23, 3-24, and 3-25 display recreation use summaries. The opportunity class given for each area is a crowding indicator, not a quota.

Table 3-23 Overnight Use

YEAR	# of Permits Issued ³	# People per Permit ⁴	Average Length of stay ⁴	RVD = one person for 12 hour	Total Overnight RVD's per year
1997	3080	3.1	3.1	2	59,198
1998	2196	3.1	3.1	2	42,207
1999	2532	3.1	3.1	2	48,665
2000	1959	3.1	3.1	2	37,652
2001	2559	3.1	3.1	2	48,184
2002	2857	3.1	3.1	2	54,912

¹ Example: "Policies and Guidelines for Fish and Wildlife Management in National Forest and Bureau Of Land Management Wilderness", as referenced in Memorandum, August 9, 2002.

² Example: Executive Order 12962 –Recreational Fisheries, "Federal agencies shall... improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resource for increased recreational fishing opportunities..." Signed by the President on June 7, 1995.

³ Data from the Summit Ranger District front desk tally book for all wilderness areas. It is estimated that 75% of the total wilderness users enter the Emigrant Wilderness. Emigrant Backcountry Rangers estimate 25% of people in the Emigrant Wilderness do not have a permit.

⁴ Average number of people per permit and average stay is from the Emigrant Wilderness Management Direction (p. 145).

Table 3-24 Day Use

Year	Total Day Use RVDs per Year*
1997	11,840
1998	8,441
1999	9,733
2000	7,530
2001	9,837
2002	10,982

*Day use estimated at 20% of overnight use (Emigrant Wilderness Direction, p. 144).

Table 3-25 RVD Wilderness Use

Year	Total RVD Use per Year
1997	71,037
1998	50,649
1999	58,398
2000	45,182
2001	59,021
2002	65,894

3.6.3. Dams in the Emigrant Wilderness

3.6.3.1 East fork Cherry Creek

Snow Lake

The opportunity class (OC) designation for this area is OC III with a maximum number of three groups camping at the lake at any one time. There are approximately 16 campsites scattered on the northwest side of the lake. About half of the campsites are 100 feet away from the edge of the water and the remaining campsites average less than 50 feet from the waters edge. This is a popular destination for private stock users. There is an old mine site and related trash nearby. Timbers and other found material from those sites are used as part of camping sites. Although no campfires are allowed above 9,000 feet in elevation, there are several large fire rings evident.

This lake is considered to have moderate recreation use estimated at 0.8% of the total overnight use for the Emigrant Wilderness¹. The lake is scheduled for stocking every odd year, was last stocked in 2001, and has self-sustaining populations of both brook and rainbow trout. This is one of the better fisheries in the Wilderness based on condition of fish and angler reports. The dams are intact; however, the control valve does not function and gradual release of water contributes to downstream flows. This provides flows sustaining the fishery downstream through Horse Meadow.

Snow Lake is accessed by a secondary trail off primary trail 21E10. There are twelve dams of mortared rock construction readily seen from many vantage points around the lake and highly visible in the northwest side of the lake (outlet). The dams vary in length from 3 to 80 feet and range from 1-8 feet high.

Bigelow Lake

The OC designation for this area is OC II with a maximum number of two groups camping at the lake at any one time. There are approximately nine campsites scattered on the northwest and south sides of the lake. The rocky terrain precludes camping in many places. Campsites vary from 45 to 150 feet from the edge of the lake. The fire restriction above

¹The estimated amount of recreation use for each of the dams is from the Final Environmental Impact Statement for the Emigrant Wilderness Management Direction. A Recreation Visitor Days (RVD's) is one person visiting the forest for a 12-hour period.

9,000 feet elevation is not well observed, as there are fire rings in all campsites. Although the wilderness staff frequently removes them, they keep reappearing.

This lake is considered to have low to moderate recreation use estimated at 0.3% of the total overnight use for the Emigrant Wilderness. The lake is stocked annually and was last stocked in 2002. There is natural reproduction in the lake. Anglers value Bigelow Lake as a high quality rainbow trout habitat. The catch in 1997-99 surveys was over two per hour. This dam helps provide flows to sustain the fishery downstream through Horse Meadow.

Bigelow Lake is accessed by secondary level trail 21E52 from Horse Meadow and by historic ways 21E53 and 21E08 from Black Bear Lake and Snow Lake respectively. There are five dams of mortared rock construction readily seen from many vantage points around the lake and highly visible from the trails. The dams vary from 130 feet to 10 feet long and 1-12 feet high.

Horse Meadow

The OC designation for this area is OC III with a maximum number of three groups camping in the meadow at any one time. The site is a popular commercial stock user destination as layover and staging for day trips. The meadow is naturally sub-irrigated, providing excellent forage for stock. Drift fencing is available. Areas around the cabin and barn are highly used and impacted by stock. This site is used for snow surveys during the winter. The five other campsites observed are along the meadow edge and away from the water. This meadow is considered to have low recreation use estimated at 0.08% of the total overnight use for the Emigrant Wilderness. Horse Meadow has a self-sustaining population of brook trout in the stream unaffected by presence of the dam. No fishing data is available for this site.

Primary trails 21E11 and 21E09 access Horse Meadow directly. Secondary route 21E08 comes in from Black Bear Lake and an historic way connects between trails on the east side of the meadow. The two mortared rock masonry dams are deteriorated and not readily visible because their poor condition as dams makes the rocks more natural appearing.

Huckleberry Lake

The OC designation for this area is OC III with a maximum number of eight groups camping at the lake at any one time. There are approximately 40 campsites scattered around the lake, except in the northwest quadrant. Three quarters of the campsites are less than 100 feet from the edge of the lake. This is a popular destination for commercial and private stock users.

This lake is considered to have high recreation use estimated at 3.9% of the total overnight use for the Emigrant Wilderness. The lake is a naturally reproducing fishery of rainbow and brook trout, including a shallow high meadow complex that produces excellent, large fish. The lake supports fisheries in the stream above and below the lake.

Huckleberry Lake is accessed by primary level trail 21E11 from the south that traverses the length of the lake, and trail 21E17 on the northeast side. In addition, an historic way comes into the lake at the west end from the north. There are seven dams of mortared rock construction, most of which are not readily visible from the trails because they are low profile. The dams vary from 4 feet to 50 feet long and all but one (3') are 2 feet high. The main, largest dam is visible from points near the lake outlet.

3.6.3.2. North Fork Cherry Creek

High Emigrant Lake

The OC designation for this area is OC II with a maximum number of two groups camping at the lake at any one time (crowding standard, not quota). There are campsites in the vicinity around the lake, but none are adjacent to the lake. The terrain here is open with little vegetation, apparently not a preferred setting for recreation. Campfires are not allowed above 9,000 feet and that restriction may serve to discourage camping at High Emigrant Lake.

This lake is considered to have low use estimated at 0.51% of the total overnight use for the Emigrant Wilderness. High Emigrant Lake is stocked every other year with rainbow (last in 2001) and there are brook trout in the lake as well which may be reproducing, current data is limited. High Emigrant Lake helps support the fishery in Emigrant Meadow Lake by providing spawning and rearing habitat in the stream maintained below this dam.

Access to High Emigrant Lake is via Big Sam Trail 21E10. This trail fords the creek below the dam, though many hikers do use the dam as a bridge instead. The single dam is located in the southwest end of the lake and its mortared rock construction is highly visible.

Emigrant Meadow Lake

The OC designation for this area is OC II with a maximum number of one group camping at the lake at any one time. Of the eight campsites observed near Emigrant Meadow Lake, approximately half of these sites near the lake occur within 100 feet of the water. The remaining campsites are located on the bluffs away from the lake in clumps of small trees. This is a popular destination site for commercial stock users. The lake is considered to have moderate recreation use estimated at 1.5% of the total overnight use for the Emigrant Wilderness. Emigrant Meadow Lake is not stocked and has reproducing populations of rainbow and brook trout. Trout in this lake exhibit the highest condition factor in the Emigrant Wilderness. Angling experiences are highly valued here, as well as wildlife viewing of bird species.

The majority of users to Emigrant Meadow Lake access the lake via primary trail 21E04 over Brown Bear Pass and secondary trail 21E05. View of the mortared rock masonry of the dam on the west side of the lake is obscured from any of the trails, but noticeable in the immediate vicinity.

Middle Emigrant Lake

The OC designation for this area is OC II with a maximum number of one group camping at the lake at any one time. Of six campsites observed near Middle Emigrant Lake, all are near the lake and occur within 100 feet of the water. The bluff sites on the southeast are not used.

This lake is considered to have low recreation use estimated at 0.32% of the total overnight use for the Emigrant Wilderness. Middle Emigrant Lake is not stocked and has reproducing populations of rainbow and brook trout. Angling is equally good here as the lakes nearby, but this is not an especially popular destination site. The use tends to gravitate to Emigrant Meadow or Emigrant Lake.

Secondary trail 21E05 accesses Middle Emigrant Lake directly and an historic way accesses the lake from secondary route 21E06. View of the mortared rock masonry of the dam on the southwest side of the lake is obscured from 21E05, but the historic way passes close to the dam and is visible.

Emigrant Lake

The OC designation for this area is OC III with a maximum number of seven groups camping at the lake at any one time. The crowding standard is generally in the OC IV standard. There are relatively few campsites evaluated on Emigrant Lake that are on the west end near the dam and a few on the south side toward the west. These sites are showing signs of heavy use and occur within 100 feet of the water. No campfires are allowed within ½ mile of the lake (Forest Order 92-1(4)) and firewood is scarce; however, this restriction is not very well observed. Signing is in place and non-compliance is at a low 5-10%. This is a commercial pack station destination and is used by private stock users as well. It is one of the most popular sites for these users.

This lake is considered to have heavy recreation use estimated at 5.5% of the total overnight use for the Emigrant Wilderness. Emigrant Lake, the largest in the Wilderness with 213 surface acres, is considered excellent for fishing and is not stocked because it has reproducing populations of rainbow and brook trout. Emigrant Lake benefits and is supplied water from High, Middle and Emigrant Meadow lakes.

The majority of users to Emigrant Lake access the lake via trail 21E09 from the west, trail 21E11 over Mosquito Pass from the North (this is the most heavily used access route by both Kennedy meadows Pack Station and private visitors), and an historic way from the trail to the south side of the lake. The dam vicinity is accessed from historic way 21E21, which also connects to the primary trail. The long (80') mortared rock masonry dam is located in the west end of the lake and is obvious from vantage points in that vicinity and from trails.

Cow Meadow Lake

The OC designation for this area is OC III with a maximum number of four groups camping at the lake at any one time. The lake is a popular private stock user destination. A drift fence is available to allow low impact stock holding. There are few campsites observed, except for the stock sites and they show considerable use.

This lake is considered to have moderate recreation use estimated at 1.6% of the total overnight use for the Emigrant Wilderness. Although the lake is scheduled to be stocked every other year and was last stocked in 1998, as of 1999 it is managed as a self-sustaining fishery with reproducing populations of rainbow and brook trout. The stream is especially productive.

Primary trail 21E17 accesses Cow Meadow Lake directly on the east side and an historic way accesses the other areas of the lakeside from that trail. The three mortared rock masonry dams still in place are obvious when located, but not easy to find because they are low in profile. They are above the pool level of the lake since the main dam no longer exists.

3.6.3.3. Middle Fork Cherry Creek

Red Can Lake

The OC designation for this area is OC II with a maximum number of two groups allowed to camp at the lake at any one time. There are seven campsites scattered around the lake in level areas. Some are used by campers with stock. These sites are showing signs of heavy use and several occur within 100 feet of the water. The single earth-fill dam has a low profile. It is grown over with vegetation, including a tree that threatens the stability of the dam. Historic way 20E26 accesses the lake from the southwest. This route is cross-country from Karl's lake.

This lake is considered to have low to moderate recreation use estimated at 0.5% of the total overnight use for the Emigrant Wilderness. Red Can Lake is a popular and excellent fishery with good condition factors for fish although it does not have a reproducing population. The lake is scheduled for stocking annually (rainbow trout) and was last stocked in 2001.

Leighton Lake

The OC designation for this area is OC III with a maximum number of three groups camping at the lake at any one time. There are only six campsites near the lake, all but one on the south side. These campsites are considered well distributed, but most are closer to water than 100 feet. The majority of sites are in good shape. Stock is precluded from getting to the lake area due to difficult terrain. It is generally difficult to find, although dedicated anglers do make the trip.

This lake is considered to have low recreation use area estimated at 0.17% of the total overnight use for the Emigrant Wilderness. Nearly all use is from anglers coming for large rainbow trout that have grown from stocking every other year (last in 2001). There is currently no reproduction of trout in the lake or associated stream.

Leighton Lake is hard to find via a primitive historic way to Karl's Lake then cross-country to Leighton. The small rock and soil embankment of the dam is not easy to see and many logs jam the lake above the dam. This dam was constructed in 1925 by Fred Leighton and is a key element in the historic value placed on the dam system in the wilderness. A few visitors probably use the area in deference to that cultural pattern. Certainly, the idea of this dam and its lake is special to local residents.

Yellowhammer Lake

The OC designation for this area is OC II with a maximum number of two groups camping at the lake at any one time. There are approximately ten campsites on the west side of the lake. About half of the campsites are 100 feet away from the edge of the water and other half average approximately 45 feet from the waters edge. Overnight camping with stock occurs at the Yellowhammer Cabin site at the south end of the lake. This is a popular destination for Aspen Meadow Pack Station.

This lake is considered to have low recreation use estimated at 0.63% of the total overnight use for the Emigrant Wilderness. The lake is stocked with rainbow trout annually and it is not know if any of the stock is reproducing.

Primitive and cross-country routes from historic way 20E18 access Yellowhammer Lake. The dam is a small rock construction without mortar in deteriorated condition and is not easily seen. If the observer did not know the rocks came from a dam construction, they might be viewed as naturally occurring; however, the old cable that remains is an eye sore.

3.6.3.4. West Fork Cherry Creek

Long Lake

The OC designation for this area is OC II with a maximum number of four groups camping at the lake at any one time. The campsites are evenly distributed around the lake and about two-thirds are less than 100 feet from the edge of the water. The condition of the campsites varies from very little evidence of use to heavy use with no vegetation left around the site. Campsites are limited to four head of stock per group within ¼ mile of the lake.

This is a high recreation use area with use estimated at 2.3% of the overnight RVD in the wilderness. The lake is stocked annually and was last stocked in 2002. This is a popular rainbow trout fishery for day trips from other lakes in the surrounding area. Long Lake dam helps provide flows to sustain the fishery downstream to Deer Lake, which has a self-sustaining trout population, in part due to flows provided by Long Lake.

Access to Long Lake can occur from the south off primary trail 20E16 along a Historic Way Trail that circumvents the lake, or from a secondary trail coming in from primary trail 20E12. There are eight dams of mortared rock construction, four of which are readily seen from vantage points around the south (outlet) end of the lake. The other four dams are low profile and less visible to the passerby. The dams vary from 5 to 34 feet long and 2-9 feet high.

Lower Buck Lake

The OC designation for this area is OC III with a maximum number of ten¹ groups camping at both Buck Lakes at any one time. There are approximately 23 campsites along Lower Buck Lake. Approximately half of these sites are showing signs of heavy use and occur within 100 feet of the water along the eastern shore of the lake. The remaining campsites are located on the north side of the lake and average at least 100 feet away from the water. There are not many good campsites for stock. Most of the stock use goes to Upper Buck Lake.

This lake is considered to have moderate to high recreation use estimated at 5% of the total overnight use for the Emigrant Wilderness for both Buck Lakes. Lower Buck Lake is considered the one of the most popular lakes for anglers (CDFG, 1999) and is stocked annually with rainbow trout. Lower Buck Lake also helps support the fishery in Wood Lake, which is considered the second most popular angling lake in the Emigrant Wilderness and is maintained by natural reproduction.

The majority of users to Lower Buck Lake access the lake via Lower Buck Lake Spur, 21E16. This trail leaves the Crabtree Trail and travels along the west side of Upper Buck Lake before crossing between the two lakes and traveling along the eastside of Lower Buck Lake to trail 21E17. The mortared rock masonry structure is located in the southwest end of the lake and is hidden in a gap that makes seeing the dam difficult unless the viewer is immediately below it.

¹ Includes all the Buck Lakes

3.6.3.5. Lily Creek

Y-Meadow Lake

The OC designation for this area is OC III with a maximum number of three groups camping at the lake at any one time (crowding indicator, not quota). There are approximately 20 campsites, mostly on the east and north side of Y-Meadow Lake. About half of the campsites average 240 feet away from the edge of the water and the remaining campsites average approximately 60 feet from the waters edge. The condition of the campsites varies. Some show very little evidence of use while others have been trampled to the point that no vegetation remains around the site. The campsites are considered limited and exposed with very few sites for stock. Most of the recreation use around this lake is backpacker use. This is a moderate recreation use area with use estimated at 1.7% of the overnight RVD use in the wilderness.

There are no fish in the lake at this time because the lake was accidentally drained in the early 1990s and it was not re-stocked with fish. Additionally, Y-Meadow is not currently stocked and not a recreational fishery. Access to Y-Meadow Lake can occur from either from the north along a Historic Way Trail that leaves the Bear Lake Spur Trail 19E09, or a Historic Way Trail coming from the south from Bear Lake via the same Historic Way as from the north. The top of the mortared rock masonry dam is visible from the lakeside near the dam and campers coming up the drainage from Bear Lake view the very high and obvious riprap fill structure 24 feet high.

Bear Lake

The OC designation for this area is OC IV with a maximum number of six groups camping at the lake at any one time. There are approximately 22 campsites, mostly on the southwest/west side of Bear Lake. The majority of the campsites are at least 100 feet away from the edge of the water. Overnight stock holding is prohibited within ¼ mile of Bear Lake. Most of the campsites are in fairly good condition due to the granite rock in the area. A number of the sites are recommended for closure and rehabilitation (USFS Monitoring Survey 1997).

This lake is considered a high recreation use area for both day use and short overnight stays. This area is a good stopover for travel to other overnight areas. The overnight use is estimated at 3.3% of the overnight RVD use in the wilderness. One of the reasons for this lakes' popularity is the fishing. Up until 1998, the lake was stocked with rainbow trout and is now considered a naturally producing fishery. Brook trout have also been caught (CDFG Angular survey, 1998).

Access to Bear Lake is by the main trail (Crabtree trail 20E16) and then off a spur to Bear Lake. What is left of the mortared rock dam is visible from the trail, but it is considerably deteriorated and grown over with vegetation so the steps downstream are not very well seen.

3.6.3.6. South Fork Stanislaus

Cooper Meadow

The OC designation for this area is OC III with a maximum number of four groups camping at the meadow at any one time. There are approximately eight inventoried camping areas

around Cooper Meadow. The majority of the campsites are located at least 100 feet away from the stream and pools. The sites show little evidence of use, except near Cooper Cabin. Cooper Cabin is located on the northwest side of the lake and is the main attraction of the area. There is a moderate amount of recreation use occurring here with most use occurring during hunting season. This is a moderate use recreation area with an estimated amount of use at 1.0% of the overnight RVD use in the wilderness.

There is no fishing data available for this lake since the primary reason for the dam was for meadow improvement, although there have been brook trout in the meadow pools from previous stocking. Access to Cooper Meadow is via an historic way trail off the Cooper Meadow Trail 20E15. The dam is located at the southwestern end of the meadow and is difficult to see due to the grass and silt up stream. Most visitors would overlook the dam due to its location, size, and shape being similar to nearby rock.

Whitesides Meadow

The OC designation for this area is OC III with a maximum number of five groups camping at the lake at any one time (crowding indicator, not quota). There are approximately 14 inventoried campsites around Whitesides Meadow. The campsites are well distributed and hidden from view. There is a moderate amount of recreation use here with most of the use occurring during hunting season. This is a moderately used recreation area with an estimated 1.4% of the overnight RVDs in the wilderness.

There is no fisheries resource in the stream or pools associated with the meadow and the water resource is very low during the late summer season. Access to Whitesides Meadow is via a popular trail, Burst Rock trail 20E14. The dam is located at the southwestern end of the lake and is difficult to see due to the grass growing over the structure. The dam is not straight, but curves in an s-shape 118 feet across the meadow. It holds a small pool.

3.6.4. Effects to Recreation

The permit system has identified over 100 recreation destinations in the Emigrant Wilderness, 18 of these are sites associated with the dams. Among these 18, several of the lakes attract a notable percentage of the visitors (Emigrant, Huckleberry, and Long). Stock users have favorites among these sites as well. The existence of dams at these sites is not known to be a factor in visitation to individual sites, although the existence of the dams is known to be important to some visitors and to people in the local community because of their history. Visiting and camping near lakes in the Emigrant includes the potential for recreational trout fishing and the quality of the experience is dependent on conditions and populations of fish. Fish populations are likely to persist under each alternative through either self-sustaining reproduction or ongoing CDFG fish stocking (Fisheries, Section 3.8). The specific event of repairing dams would potentially affect, to some degree, the opportunity for solitude and the overall wilderness experience of visitors for the duration of the staging and construction at those sites. Surface area of the lakes may be altered and the distance between lakeshore and popular camping locations may change, becoming closer to or farther from the shore.

RESPONSE TO ISSUES

There is concern that the loss of any dams would negatively influence the local recreation-based economy. If the dams are not functioning as intended, there may be fewer visitors

entering the wilderness because there may be less water in the lakes and less water in the lakes could mean less fish for anglers. This issue is addressed indirectly by expected changes in the population of the fish (Fisheries, Section 3.8). In general, alternatives that sustain or increase the numbers of fish, or maintain or increase the potential for fish to grow to a larger size, increases the quality of the angler experience.

3.6.4.1. ALTERNATIVE 1 – PROPOSED ACTION

3.6.4.1.1. Direct and Indirect Effects

East Fork Cherry Creek

Snow Lake

Snow Lake dam would be restored and maintained under this alternative. Snow Lake has self-sustaining populations of both brook and rainbow trout and the maintenance of the dam would not alter the fishing experience in the lake. Flow increases downstream would create more stream fishing. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present leakage, causing withdrawal of the shoreline. Some existing sites that are now too near the water would be further away during the dry season, a preferred condition. However, new sites might result because of the change. During the time of dam reconstruction, the disturbance created by an estimated four-member crew working fifteen days would slightly affect the recreation experience at the lake and on trails used for access during that time. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Bigelow Lake

Bigelow Lake dam would be restored and maintained under this alternative. Rainbow trout have been stocked annually, while brook trout are self-sustaining. The maintenance of the dam would not alter the current high quality fishing experience in the lake. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present leakage, causing withdrawal of the shoreline. The change may cause additional campsites to be established late in the season.

During the repair of the dams, the disturbance created by an estimated four-member crew working ten days would affect visitor's recreation experience at the lake and on trails used for access during that time. An early, complete draw down of the lake (if selected for construction needs) would influence lake conditions for the entire season, including shore location, vegetation, and appearance. If the work were done at the natural low water season, recreation would be less impacted. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Horse Meadow

Horse Meadow would not be maintained under this alternative. Horse meadow has a self-sustaining population of brook trout and the fishing experience would continue to be available. Under this alternative, the dam would continue to deteriorate, sediment that has

accumulated behind the dam would scour, and the grade would gradually cut down to the historic channel. The redistribution of sediment could cause a temporary reduction of pools, changing the appearance of the meadow. Deterioration of the dam would not impact the commercial stock use of the meadow or the low recreation use of the site.

Huckleberry Lake

Huckleberry Lake dam would be restored and maintained under this alternative. Brook trout and rainbow trout are self-sustaining in the lake, inlet, and outlet streams. The maintenance of the dams would not alter the fishing experience in the lake. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow, causing withdrawal of the shoreline. Some existing sites that are now too near the water would be further away during the dry season, a preferred condition. However, new sites might be a consequence of the change. The high recreation use of Huckleberry Lake would continue after the dam is repaired and maintained. An estimated four-member crew working five days would impact visitor's recreation experience somewhat at the lake and on trails at the time of construction, but because this lake has high recreation use and the impact days are few, construction activity would largely go unnoticed. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

North Fork Cherry Creek

High Emigrant Lake

Under this alternative, the dam and control valve would be restored, and potentially more of the storage capacity could be used to augment downstream flow. The rainbow trout population in the lake is not self-sustaining, although the brook trout may be. Low recreation use of this lake coupled with a valued fishing experience for those who do come would continue when the dam structure is functional. An estimated four-member crew working ten days would impact visitor's experience during the time they are there.

Flow management at High Emigrant, in concert with stream flow maintenance dams at Emigrant Meadow, Middle Emigrant and Emigrant Lakes, cumulatively impacts fisheries at Emigrant Lakes and downstream through the North Fork Cherry Creek watershed. Thus, recreation fishing is improved in the entire system and those whose aesthetic includes water in the stream would find the setting improved from full season release, system wide. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Emigrant Meadow Lake

Under this alternative, the dam and gate would be maintained in their present good condition. The commercial stock users would see no discernable changes in their use of the camp, nor would other recreation visitors. The reservoir surface elevation would remain the same, thus there would be no change in the carrying capacity to lake rearing fish. Emigrant Meadow Lake is stocked with rainbow trout and brook trout. Both species of fish are also present and self-sustaining. The release of stored water would continue to augment downstream flow. If more water is released at some point, the lake may be drawn down further than at present during dry years and lake carrying capacity for fish may decline. In

the event that capacity declines, the quality of experience for fishing in the lake would also decline. It is estimated that two crewmembers repairing the valve system for one day would have little or no impact on recreation visitors. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Middle Emigrant Lake

The repair of Middle Emigrant Lake dam would raise the impoundment three feet at full capacity. The lake acreage would be restored to the previous impoundment level of 18 acres. The flow control valve would be managed to release the added storage capacity. Fish survival and carrying capacity would be increased in both the lake and outlet stream, which has the potential to increase fishing at this lake. Current low recreation use could increase. During the time of dam repair, the disturbance created by an estimated four-member crew working ten days would impact the recreation experience at the lake immediately adjacent to the outlet area, at locations where rock would be moved, and on trails used for access during construction. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Emigrant Lake

This alternative would repair the flow control valve enabling better use of the Emigrant Lake reservoir water storage and release capability. Dam repair and flow management would enable increased discharge to augment summer flows and increase survival and carrying capacity of fish in the North Fork of Cherry Creek and recreation stream fishing would be possible.

Flow management and release of stored water would gradually draw down Emigrant Lake during the late summer and early fall. If all impounded water were released, the surface area of the lake would diminish in elevation by nine feet and 50 surface acres of lake. (The existing uncontrolled water release generally does not result in the release of all impounded water.) After release of the impounded water, the shore would recede and the recreation setting would diminish because previously inundated area would lack vegetation and a large band of the rock with mineral deposit discoloration would be visible. However, the high recreation use of this lake would not likely diminish and would continue to follow current trends of increasing.

During reconstruction of dams, the disturbance created by an estimated four-member crew working ten days would impact visitor's recreation experience at the outlet area of the lake, on the lakeshore near the dam, and on trails used for access during that time. An early, complete draw down of the lake (if selected for construction needs) would impact lake conditions for the entire season including shore location, vegetation, and appearance. If the work were done at the natural low water season, recreation would be less impacted. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Cow Meadow

Reconstruction of the dam and flow control valve would raise the lake level three feet. The maximum depth would increase from 33' to 36' deep, and 18 acres would be added to the surface area. There would be a net benefit to fish and thereby to the fishing experience. This popular site for stock users would continue to be used and preference for this site could increase as the lake size increases and fishing improves.

During reconstruction of dams, the disturbance created by an estimated four-member crew working fifteen days would impact visitor's recreation experience at the lake and on trails used for access during that time. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Middle Fork Cherry Creek

Red Can Lake

This dam is not repaired or maintained in this alternative. Recreation use would continue in the low to moderate range. Red Can Lake is stocked annually with rainbow trout and the fishing opportunity would not be altered even if the dam fails because the loss of one surface acre would not impact camping for users with or without stock.

Leighton Lake

Restoration of the integrity of the dam and repair of valve would increase the maximum depth and enable release of some water to augment downstream flow. Leighton Lake is stocked with rainbow trout annually, although there is no reproduction. The fishing would not change from current condition and levels. Anglers would continue to come for the larger sizes of Rainbow Trout. The current level of low recreation use would continue after improvements to the dam because the lake is hard to find and not available to stock users. Those seeking a solitary experience would continue to appreciate the isolation here except during the time when repair takes place when an estimated four-person crew stays in the area for fifteen days. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Yellowhammer Lake

This dam would not be repaired or maintained and in its current condition does not impound water, although it slows release of water during wet periods. As the dam further deteriorates, seasonal flooding would diminish. Those drier conditions in the future (unknown timing) might reduce the foraging opportunities for stock animals. The low recreation use of the lake would continue, as would its popularity as a destination for Aspen Meadow Pack Station for the foreseeable future. The remnants of the unmortared dam are already relatively natural looking and would become more so as the piled rocks scatter.

West Fork Cherry Creek

Long Lake

The dams need repair to seal them but the walls are sound and the valve system is still functional. The conditions for maintenance would remain the same. Fish do not reproduce

in Long Lake or in its inlet streams, but rainbow trout would continue to be stocked; therefore, the high quality fishing experience would stay the same. The release of stored water would improve the setting and aesthetic appeal along the stream in addition to augmenting conditions for fish. The high recreation use at this lake would continue and the restrictions on stock use left in place. An estimated four days of dam maintenance by a two-member crew would not impact other visitors camping or hiking at the lake. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Lower Buck Lake

Reconstruction and flow regulation would maintain a condition similar to the current leakage from the existing dam. Lower Buck has been stocked with rainbow trout and its popularity with anglers would continue. During reconstruction of the dams, the disturbance created by an estimated four-member crew working twelve days would impact visitor's recreation experience at the outlet area of the lake and on trails used for access during that time. The recommended early draw down of the lake in order to complete the repairs would impact lake conditions for the entire season including shore location, vegetation, fish, and appearance. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Lily Creek

Y-Meadow

Repair of the dam and water valve would enable more of the stored water to be released during dry periods. Summer and fall release from Y-Meadow dam supports stream dwelling trout between the dam and Bear Lake which is advantageous to the fishing experience in Bear Lake and in the stream. The recommended early draw down of the lake in order to complete the repairs would impact lake recreation conditions for the entire season, including shore location, vegetation, and appearance of the lakeshore and adjacent meadow. The visual anomaly of the 24-foot high riprap would continue to be seen. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Bear Lake

Under this alternative, the Bear Lake impoundment would not be maintained. The dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. Brook and rainbow trout are self-sustaining in the lake now, but the popular fishing experience may be lessened by a reduction in fish population as the volume of the lake reduces unless augmented by increased stocking. The location of this lake encourages day use, stopover use, and stock use. These would remain the same or follow trends toward increasing.

South Fork Stanislaus

Cooper Lake

Under this alternative, the dam would gradually deteriorate and the streambed would return to its former grade. The maximum depth of pools in the meadow would decrease, but trout would likely to persist through the change in habitat from pond to low gradient stream. Therefore, the current level of fishing opportunity would remain. The loss of pools reduces diversity in the meadow making the setting for recreation less attractive; although it is likely the use of the site for hunting would continue as it is now.

Whitesides Meadow

Continued deterioration of the dam would have no impact on the moderate amount of current recreation use, primarily for hunting.

3.6.4.1.2. Cumulative Effects

The limited impacts to recreation from maintaining or not maintaining the dams do not contribute to any recreation actions, past or in the foreseeable future, that would cause any cumulative effects.

3.6.4.2. ALTERNATIVE 2 – NO ACTION

3.6.4.2.1. Direct and Indirect Effects

East Fork Cherry Creek

Snow Lake

Under this alternative, the dam would eventually deteriorate and revert to the natural lake surface elevation. The water depth would drop ten feet and the surface area would decrease by eight acres. Snow Lake has self-sustaining populations of both brook and rainbow trout. Both species would likely to persist, but in lower numbers. The lower number of fish would nominally impact the fishing at Snow Lake. Moderate to low recreation use would continue, as it would only be marginally impacted by gradual changes in the shoreline of the lake and the increased visibility of rock faces discolored by mineral deposits. During the years when the dam walls are standing, yet no longer impound water, they would be more visually dominant and intrude into the natural setting. Once the lake level drops below the dam walls there would be less freeze/thaw effect; thus, deterioration would slow and the walls unnatural appearance would be resident in the Wilderness a long time.

Bigelow Lake

Over time, the dams would deteriorate and the lake would return to the natural lake level and acreage. Lake depth could drop nine feet and surface area decline by ten acres. Bigelow Lake has rainbow trout stocked annually and a self-sustaining brook trout population. The carrying capacity of the lake would be reduced so brook trout would likely be reduced in numbers. The fishing experience would diminish somewhat, unless stocking is increased to make up the difference. The gradual recession of the shoreline as the lake diminishes would not change appearance of the lake environment noticeably, but the height of the mineral deposits on the rock faces and shoreline boulders (ten feet high) would create a visual anomaly in the setting. During the years when the dam walls are standing, yet no

longer impound water, they would be more visually dominant and detract from the natural setting all along the outlet perimeter of the lake. Once the lake level drops below the dam walls there would be less freeze/thaw effect and no potential for battering by logs in the water; thus, deterioration would slow and the walls unnatural appearance would be resident in the Wilderness a long time.

Fish survival is likely to decline between Bigelow Lake and the confluence of Horse Meadow stream; therefore, fishing would be limited. This may not be noticed, as there is not much fishing occurring.

Horse Meadow

The effects would be the same as Alternative 1.

Huckleberry Lake

Not repairing the dams or maintaining the control valves would cause the lake depth to eventually decrease by four feet and the surface area decrease by 25 acres. The gradual change would likely reduce survival rate and carrying capacity for fish, although brook trout and rainbow trout are self-sustaining in the lake and its inlet and outlet streams. The popularity of Huckleberry as a destination for commercial and private stock users would be slightly impacted by the diminishing availability of fish, because that is part of the expected recreation experience. It is possible that stocking would be required to augment the fish population at some point in the future. The gradual recession of the shoreline as the lake diminishes would not change appearance of the lake environment noticeably, including the height of the mineral deposits on the rock faces and shoreline boulders. The four feet of discoloration is not much different than the natural band caused by annual draw down in lakes in the Emigrant. The dam walls are very low and would not be visually dominant or intrude into the natural setting any more than they do now.

North Fork Cherry Creek

High Emigrant Lake

The deterioration of the High Emigrant dam would eventually lower lake depth by eight feet and the surface area by four acres. The reduced size and volume would lower the carrying capacity of the lake for trout. The lake is stocked, so the change in recreation fishing would not be noticeable. The low level of recreation visitors at this lake would not be altered by the gradual changes of the dam. The mineral deposits on the rock face at the outlet and shoreline boulders are obvious as the lake draws down naturally, but would become more visually dominant when the lake stays at its lower level. The level band of mineral deposit discoloration would be eight feet high. During the years when dam wall is standing, yet no longer impounds water, the dam would intrude into the natural setting near the lake outlet.

Emigrant Meadow Lake

Under this alternative, the dam would not be maintained and allowed to continue to gradually deteriorate. The lake surface elevation would eventually drop six feet and the surface area shrink by 13 acres. Emigrant Meadow Lake has rainbow trout and brook trout that are self-sustaining. At some point, the lake would draw down and the carrying capacity for fish would decline unless stocking is used to keep the fishing constant. The gradual recession of the shoreline as the lake diminishes would not change appearance of the lake

environment noticeably. The mineral deposits on the rock face at the outlet and shoreline boulders would be obvious as the lake draws down naturally, but would become more visually dominant when the lake stays at its lower level. The level band of mineral deposit discoloration would be six feet high. During the years when the dam wall is standing, yet no longer impounds water, it would be visually dominant and detract from the natural setting at the outlet of the dam.

Middle Emigrant Lake

The loss of the remaining three feet of the dam would reduce the depth of the lake by three feet (natural lake level) and reduce the surface area approximately four acres. If there were several successive years of drought, the loss of fish year classes could jeopardize the trout population. Unless stocking was resumed, the recreation fishing could be reduced. The low level of recreation would remain the same since there would be no reason for the site to become more popular. The gradual recession of the shoreline as the lake diminishes would not change appearance of the lake environment noticeably, including the height of the mineral deposits on the rock faces and shoreline boulders. The three feet of discoloration is commonly observed as the natural band caused by annual draw down in lakes in the Emigrant. Although the dam wall is low, it is long and when fully exposed would be visually dominant in the natural setting of the lake at the outlet.

Emigrant Lake

Under this alternative, the dam would not be maintained and allowed to continue to gradually deteriorate. Loss of the dam would result in a decrease in lake depth of nine feet and a loss of 50 acres of surface area. The carrying capacity of fish in the lake would be likely to diminish and the potential for high quality recreation fishing would be reduced. The popularity of Emigrant as a destination for commercial and private stock users would be slightly impacted by the diminishing availability of fish, as that is part of the expected recreation experience. It is possible that stocking would be required to augment the fish population at some point in the future. The gradual recession of the shoreline due to the reduction of fifty acres of water may change the appearance of the lakeshore environment noticeably if the decline is accelerated by drought over just a few years. The height of the mineral deposits on the rock faces and shoreline boulders (ten feet high) would create a visual anomaly since none of the lakes in the Emigrant would naturally have a high band of discoloration. During the years when the dam wall is standing, yet no longer impounding water, it would be more visually dominant and detract from the natural setting at the outlet of the lake. Once the lake level drops below the dam wall, there would not be much freeze/thaw effect and deterioration would slow, causing the walls unnatural appearance to be resident in the Wilderness a long time.

Cow Meadow

The main dam is already seriously deteriorated and the lake is at its natural level. Rainbow trout and brook trout would continue to reproduce naturally in the stream. Since the lake level has dropped below the dams, there is not much freeze/thaw effect or battering by logs in the water. Deterioration has slowed and the unnatural appearance of dam walls would be resident for some time into the future. The use by stock users would continue and a moderate level of recreation would persist.

Middle Fork Cherry Creek*Red Can Lake*

The effects would be the same as Alternative 1.

Leighton Lake

The dam is present, but the porosity of the dam prevents complete impoundment of water. During dry periods, the lake surface drops below the outlet. The complete loss of the dam would lower the elevation by six feet and decrease the maximum surface area by four acres. Leighton Lake is stocked with rainbow trout annually and the fishing experience would remain constant as long as that occurs. Moderate to low recreation use would continue and be only marginally impacted by gradual changes in the shoreline of the lake and increased visibility of rock faces discolored by mineral deposits in a wider band than naturally occurring. Because this is not a mortared dam, deterioration of the dam top would increase with each flooding season giving the surface a ragged look. However, the substantial structure of the dam would survive as a visual anomaly for a long time.

Yellowhammer Lake

The effects would be the same as Alternative 1.

West Fork Cherry Creek*Long Lake*

Under this alternative, the dams would gradually deteriorate and the lake would revert to the original basin. The reservoir depth would decrease by eight feet and the surface would decrease by 13 acres. The carrying capacity would drop commensurate with the decrease in area, but rainbow trout have been stocked nearly every year since 1950. As long as stocking continues, the same quality fishing experience would prevail even with the reduction in acres. High recreation use would continue and the campsite restrictions on stock would remain in force. The use of the lake for day trips from other lakes would continue as long as the quality fishing experience remains. The gradual recession of the shoreline would not alter the appearance of the lakeshore environment noticeably. The height of the mineral deposits on the rock faces and shoreline boulders (8 feet high) would create a visual anomaly in the setting. During the years when the four large dam walls are standing, yet no longer impounding water, they would be more visually dominant and detract from the natural setting at the outlet of the lake. The four low dam walls would not be as visually dominant or intrude into the natural setting any more than they do now. Once the lake level drops below the dam walls, there would not be much freeze/thaw effect and no potential for battering by logs. Deterioration would slow and the walls unnatural appearance near the lake outlet would last a long time.

Lower Buck Lake

Under this alternative, the dam would not be maintained and it would continue to deteriorate until it could no longer retain water. Loss of the dam would result in a decrease in lake depth of ten feet and loss of eight acres of surface area. The carrying capacity would drop commensurate with the decrease in area, but rainbow trout have been stocked nearly every year since 1950 and as long as that continues, the same quality fishing experience would

prevail even with the reduction in acres. The gradual recession of the shoreline would not change the appearance of the lakeshore environment noticeably. The height of the mineral deposits on the rock faces and shoreline boulders (ten feet high) would create a visual anomaly in the setting, as none of the lakes in the Emigrant would naturally have that high a band of discoloration. During the years when the dam wall is standing, yet no longer impounding water, it would be more visually dominant and detract from the natural setting at the outlet of the lake. Once the lake level drops below the dam wall, there would not be much freeze/thaw effect and no potential for battering by logs in the water. Deterioration would slow and the wall's unnatural appearance near the lake outlet would last a long time.

Lily Creek

Y-Meadow

Y-Meadow dam is a large structure that would likely persist in some form for many years even without maintenance. Eventually, as the top of the dam deteriorated, less water would be stored and released through seepage and fish would be confined to deep pools downstream for survival. The fishing opportunity in the stream between Y-meadow and Bear Lake would diminish.

Bear Lake

The effects would be the same as Alternative 1.

South Fork Stanislaus

Cooper Meadow

The effects would be the same as Alternative 1.

Whitesides Meadow

The effects would be the same as Alternative 1.

3.6.4.2.2. Cumulative Effects

The anticipated loss of carrying capacity from reduced lake size may affect fish size and condition, and potentially change fishing opportunities at some of the lakes. This can cause the pattern of use among all the lakes in the Emigrant Wilderness to be altered because some people may seek a better or alternate fishing environment elsewhere. This, added to generally increasing use of the Emigrant Wilderness could contribute to over-use of some lakes areas.

Loss of a populations of trout in these lakes added to general pressure to increase fishing opportunities may cumulatively cause more stocking of fish by CDFG to maintain population levels.

3.6.4.2.3. Other Potential Effects

Traditional users of the dam lakes who place a high value on their history and cultural content may experience great disappointment in the loss of these structures and choose not to recreate here and not carry on the family activities and oral traditions that they inherited.

3.6.4.3. ALTERNATIVE 3 – HERITAGE

3.6.4.3.1. Direct and Indirect Effects

East Fork Cherry Creek

Snow Lake

The effects would be the same as Alternative 2.

Bigelow Lake

The effects would be the same as Alternative 1.

Horse Meadow

The effects would be the same as Alternative 1.

Huckleberry Lake

The effects would be the same as Alternative 2.

North Fork Cherry Creek

High Emigrant Lake

The effects would be the same as Alternative 2.

Emigrant Meadow Lake

The effects would be the same as Alternative 1.

Middle Emigrant Lake

The effects would be the same as Alternative 2.

Emigrant Lake

The effects would be the same as Alternative 1.

Cow Meadow

The effects would be the same as Alternative 2.

Middle Fork Cherry Creek

Red Can Lake

Red Can Lake dam would continue to impound the additional 20 acre-feet of water in the lake as is. Recreation use would continue in the low to moderate range. Red Can Lake is stocked annually with rainbow trout and the fishing opportunity would not continue to be at the same level. Two days of two people removing the trees and placing sod would not likely create a disturbance to recreation visitors to Red Can Lake. Several trips across the designated route to the dam could give that trail a permanent appearance not in keeping

with management direction for trails in the Emigrant Wilderness, but proposed mitigation measures would resolve this potential impact.

Leighton Lake

The effects would be the same as Alternative 1.

Yellowhammer Lake

The effects would be the same as Alternative 1.

West Fork Cherry Creek

Long Lake

The effects would be the same as Alternative 1.

Lower Buck Lake

The effects would be the same as Alternative 1.

Lily Creek

Y-Meadow

The effects would be the same as Alternative 2.

Bear Lake

The effects would be the same as Alternative 1.

South Fork Stanislaus

Cooper Lake

The effects would be the same as Alternative 1.

Whitesides Meadow

The effects would be the same as Alternative 1.

3.6.4.3.2. Cumulative Effects

The limited impacts to recreation from maintaining or not maintaining the dams do not contribute to any recreation actions, past or in the foreseeable future, that would cause any cumulative effects.

3.7. WILDLIFE

The Emigrant Wilderness is approximately 112,000 acres and situated at elevations ranging from approximately 4,700 feet near Cherry Lake to 11,700 feet at Leavitt Peak. The 18 dams are situated at elevations ranging from 7,600 feet to 9,600 feet. Dominate surface cover types include: Barren (56%), Forest (28%), Meadow (10%), Scrub (4%), and Water

(2%)(Emigrant Wilderness Management Plan, 1998). The diversity of vegetation and wildlife within the Emigrant Wilderness are byproducts of its elevation and topography. Vegetative types include conifer and deciduous forest, meadow/riparian, chaparral, and alpine.

3.7.1. Federally Threatened and Endangered Species

The analysis of federally endangered and threatened species has been documented in a separate Biological Analysis (BA). Below is a listing of the species that are known to occur or may occur in the project area. Forest Sensitive species are analyzed in a Biological Evaluation (BE). (The BA and BE are in the project file, Stanislaus National Forest, Sonora, CA.) A summary the effects of the various alternatives on threatened, endangered, and sensitive species is provided in this document.

Federally threatened and endangered species evaluated in the BA, but not included in here are listed in the table below:

Species	Habitat	Justification
Valley elderberry long-horned Beetle - E (<i>desmocerus californicus dimorphus</i>)	Elderberry trees Central Valley	No habitat exists for this species in Project Area, as it is above the elevation range of the species
California red-legged frog -T (<i>Rana aurora draytoni</i>)	Aquatic, riparian Usually below 4,000 ft elevation	Outside geographic range of project
Lahontan cutthroat trout -T (<i>oncorynchus clarki henshawi</i>)	Lakes and streams of the Lahontan Basin	Outside geographic range of project
California Tiger Salamander – PT (<i>Ambystoma californiense</i>)	Vernal pool complexes in Sonoma and Santa Barbara Counties, CA	Outside geographic range of project

E – Endangered, T – Threatened, PT – Potentially Threatened

The following T&E species is being considered for further project analysis.

Bald Eagle

Scientific name: *Haliaeetus leucocephalus*

Status: Federally Threatened

Species Account

In 1982, a bald eagle was observed within 0.5 miles of the Emigrant Wilderness boundary. Nesting was first documented on the Stanislaus National Forest at Cherry Lake in 1994, within 0.5 miles of the Emigrant Wilderness boundary. Adults were also seen in 1995, but nesting apparently did not occur and the nest tree used in 1994 has since fallen. In 2001, a banded pair of eagles was located at Bradley Reservoir. Young were successfully fledged by this pair in 2002 and 2003. Bald eagles have been sighted at Relief Reservoir, Snow Lake, Deer Lake, and Emigrant Lake within the Wilderness. In the summer of 1994, there were repeated sightings at Emigrant Lake. No sightings were received or surveys conducted in the following year (Emigrant Wilderness Management Plan, 1998, p. 135).

Habitat Status

Bald eagle wintering and nesting habitat is normally associated with lakes, reservoirs, rivers, or large streams. In California, 73% of the known nest sites were within 0.5 miles of a body of water and 89% within 1.0 mile. No nests were found over 2.0 miles from water (Lehman et al. 1980). Bald eagles are predatory scavengers and feed predominately on a variety of fish species. Recent studies show that fish biomass consumption varies from approximately 76% to 90% of total food intake.

Wintering bald eagles need an adequate food supply of fish and/or waterfowl. A perch tree is used primarily during the day for resting, preening, or hunting. Night roosts are in timber stands, which offer some protection from the weather. Roost trees are generally large open-topped trees with stout lateral limbs. Most wintering areas are isolated, with a low degree of human disturbance. On the Shasta-Trinity National Forest in California, ponderosa pine stands are preferred for wintering and nesting bald eagles.

Bald eagle nests are usually located in uneven-aged, multi-storied stands with old growth components. Factors such as relative tree height, diameter, species, position on the surrounding topography, distance to water, and distance from disturbance also appear to influence nest site selection. Trees selected for nesting are characteristically one of the largest in the stand or at least co-dominant with the over-story. Nest trees usually provide an unobstructed view of the associated body of water and are often predominately located on the topography. Live, mature trees with deformed tops are occasionally selected for nesting. Of the nest trees identified in California, about 71% were ponderosa pine (*Pinus ponderosa*), 16% were sugar pine (*Pinus lambertiana*), and 5% were incense-cedar (*Libocedrus decurrens*). The remaining 8% were distributed among five other conifer species. Nest tree characteristics have been defined by Lehman et al. (1980) as being 41-46 inches in diameter at breast height and in excess of 100 feet tall. Snags, trees with exposed lateral limbs, or those with dead tops are often present in nesting territories and are used for perching or as points of access to and from the nest. Such trees also provide vantage points for guarding and defending the nest.

In California, bald eagle nest studies have revealed the following reproductive chronology: On the Shasta-Trinity National Forest, pair re-bonding and nest reconstruction activities occurred as early as December on Shasta and Trinity lakes. Incubation varies, but generally begins as early as the beginning of February. Young hatch around mid-March to mid-April. Brooding occurs from the time of hatch until mid-July to early August. Fledging begins in late June (USDA 1993). Most young of the year migrate north while the adults remain loosely attached to the territory through the fall and early winter. Critical times of disturbance for nesting pairs runs from mid-December to late May, but may play a significant role through August as the young get older (Zeiner et al. 1990a).

Three bald eagle territories occur on the Stanislaus National Forest, two on the Summit Ranger District and one in the Groveland District. They include:

1. Beardsley Lake Bald Eagle Management Area, southwest of Beardsley Lake in Sections 14, 21, 22, & 23, T4N R17E.
2. Upper Stanislaus Bald Eagle Management Area, midway between Donnell and Beardsley lakes in Sections 8, 16, 17, & 20, T 5N R18E.
3. Cherry Lake Bald Eagle Management Area located in Sections 16 & 21, T2N R19E.

Each territory is at least 300 acres in size. These territories are part of the Stanislaus National Forest obligation to meet the Bald Eagle Recovery Plan objectives. The Cherry Lake Management Area is within 0.5 miles of the Emigrant Wilderness boundary (Emigrant Wilderness Management Plan, 1998).

3.7.2. Region 5 Sensitive Species

Sensitive Species

There are 20 species of animals designated by Region 5 as Sensitive and have been analyzed in a Biological Evaluation (BE). The following species are listed as Sensitive and have been addressed in detail in the BE.

- California spotted owl (*Strix occidentalis occidentalis*)
- Great gray owl (*Strix nebulosa*)
- Northern goshawk (*Accipiter gentiles*)
- Swainson's hawk (*Buteo swainsoni*)
- Willow flycatcher (*Empidonax treilii*)
- Western red bat (*Lasiurus blossevillei*)
- Pallid bat (*Antrozous pallidus*)
- Townsend's big eared bat (*Plecotus townsendi townsendi*)
- California wolverine (*Gulo gulo*)
- Pacific fisher (*Martes pennati*)
- Sierra Nevada red fox (*Vulpes vulpes necator*)
- American marten (*Martes Americana*)
- Western pond turtle (*Clemmys marmorata marmorata*)
- Southwestern pond turtle (*Clemmys marmota pallida*)
- Mountain yellow-legged frog (*Rana mucosa*)
- Yosemite toad (*Bufo canorus*)
- Foothill yellow-legged frog (*Rana boylei*)
- Limestone salamander (*Hydromantes brunus*)
- Relictual slender salamander (*Batrachoseps relictus*)
- Hardhead (*Mylopharodon concephalus*)
- Peregrine falcon (*Falco peregrinus*)

It was determined in the BE that the following Sensitive species may occur in the Project Area: Mountain yellow-legged frog, Yosemite toad, great gray owl, Northern goshawk, wolverine, Pacific fisher, Sierra Nevada red fox, American marten, Pallid bat, Townsend's big-eared bat, and peregrine falcon.

3.7.2.1. MOUNTAIN YELLOW-LEGGED FROG

No specific management direction is provided in the Forest Plan for the mountain yellow-legged frog. Forest Service Manual 2670.22 directs Forests to maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

Habitat Status

The mountain yellow-legged frog (MYLF) has been eliminated from 70-90% of its historic range in the Sierra Nevada (Jennings 1996, USFWS 2000, USDA 2001). The MYLF is proposed for protection through the Endangered Species Act, but has been precluded at this time by the need to take other listing actions of higher priority (USFWS, January 16, 2003). This frog is found at elevations ranging from 4,500 to 12,000 feet and is seldom far from water. It prefers well illuminated, sloping banks of meadow streams, riverbanks, isolated pools, and lake borders with vegetation that is continuous to the waters edge. Tadpoles and adults over-winter in lakes or deep pools with undercut banks that provide protection. Larvae may over-winter for up to two years before they metamorphose.

Threats to the MYLF are introduced fish, contaminants (pesticide), disease, and possibly ultraviolet radiation. MYLF eat beetles, flies, ants, bees, wasps, and true bugs. The primary predators of the MYLF are fish, garter snakes, and birds (Zeiner et.al.).

Species Account

There have been numerous sightings of MYLF within the Emigrant Wilderness. A record of sighting has found the MYLF in or around the following locations:

Blackbird Lake	Lewis Lake	Mosquito Pass
Buck Lakes	Fraser Lakes	Pruitt Lake
Chewing Gum Lake	Frog Lakes	Sardella Lake
Coolidge Meadow	Huckleberry Lake	Shallow Lake
Cow Meadow Lake	Iceland Lakes	Snow Lake
Coyote Lake	Leopold Lake	Spring Meadow
Deer Lake	Lertora Lake	Summit Meadow
Emigrant Lake	Long Lake	Wire Lakes
Estella Lake	Mosquito Lake	Woods Lakes
		Y-Meadow Lake

In addition to the lakes, many sighting were recorded in streams, unnamed ponds, and water-filled depressions. The majority of tadpoles were found in fishless ponds adjacent to or near a main body of water and adults mixed between fish-occupied lakes, streams, and small, unnamed ponds. Sighting data may be found at the Stanislaus National Forest Supervisors Office in Sonora, CA (Emigrant Wilderness EIS, 1998)(CDFG, 2003).

Considerable research on the MYLF is currently being conducted throughout the Sierra Nevada in places such as John Muir and Sequoia/Kings Canyon and Yosemite National Park (Knapp, mylfrog.com). Before 1992, all information was from incidental sightings from Forest Service personnel in the field. Beginning in 1993, lakes within the Emigrant Wilderness were formally surveyed using standard protocol method. CDFG has also conducted amphibian surveys from 1996 to the present in the Emigrant Wilderness and their data has been included in this analysis. (File, Stanislaus National Forest, Sonora, CA). See Map D-3-9.

3.7.2.2. YOSEMITE TOAD

The SNFPA (2001) describes desired future condition as habitat that supports viable populations of native...vertebrate riparian and aquatic-dependent species. Specifically for

Yosemite toad, direction is to conduct surveys of unoccupied suitable habitat within the species historic range, monitor occupied sites, and exclude livestock (including pack and saddle stock) from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads (ibid.). In addition, Forest Service Manual 2670.22 direct forests to maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

Habitat Status

The YT has been eliminated from 50% of its historic range. YT had been proposed for protection under the Endangered Species Act, but that listing is precluded at this time because of budgetary constraints (USFW, 12-10-2002). This species is found from 6,400 to 11,300 feet elevation. It prefers lake and pond areas with grassy margins in the high meadows bordered by forest and willow. This toad breeds in shallow pools, shallow lake margins, or still water of streams. Breeding occurs in shallow (< 3 inches), still water with some emergent vegetation. The YT overwinters in rodent burrows. YT feeds on insects similar to MYLF and is preyed upon by furbearers, garter snakes, and birds. The heaviest mortality occurs when breeding pools dry before metamorphosis (Zeiner et. al.).

Species Account

Forest Service and CDFG personnel have found YT in several places within the Emigrant Wilderness. Some of these locations include areas in and around:

Black Hawk Lake	Mosquito Lake	Pinto Lake
Emigrant Meadow Lake	Mosquito Pass	Wilson Meadow Lake
Grizzly Meadow	Red Bug Lake	Frog Lake
High Emigrant Lake	Ridge Lake	Whiteside Meadow
Lewis Lakes	Summit Meadow	

Surveys in the Wilderness were conducted as described for the MYLF and data is on file with the Supervisors Office in Sonora. See Map D-3-10.

3.7.2.3. GREAT GRAY OWL

The SNFPA direction regarding great gray owls is to establish and maintain a PAC around all known great gray owl nest stands that includes at least 50 acres of the highest quality nesting habitat, as well as the adjacent meadow or meadow complex that supports the prey base for nesting owls.

Habitat Status

This species typically forages in meadows or other open areas supporting small mammals. It nests and roosts in nearby dense (> than 40 percent canopy closure) coniferous forests at elevations generally between 2,500 and 8,000 feet. Both old growth and secondary growth forests are used if suitable nest sites are available. Nest sites have been documented in broken topped conifer and black oak snags, abandoned hawk nests, and artificial nest structures and are generally found within 600 feet of the forest edge. Open areas of perennial grasses and sedges provide the dominant foraging habitat. Montane voles and pocket gophers are the primary prey species in the Sierra Nevada. The smallest recorded

meadow documented for a nesting territory is 14 acres (Zeiner et. al). There is suitable habitat for the owl in the Emigrant Wilderness, although most of it is at elevations greater than the reported range of the owl (Emigrant Wilderness EIS, 1998).

Although the Emigrant Wilderness has not been surveyed recently, there are numerous areas of highly suitable great gray owl habitat within the Wilderness boundaries.

Species Account

There have been six documented sightings of the great gray owl within the Emigrant Wilderness from 1979-1992, but breeding has never been confirmed within the wilderness (file Stanislaus National Forest). Vocalization surveys conducted in 1992 did not detect any great gray owls and breeding within the Emigrant Wilderness has never been confirmed. Surveys in 2001 detected an owl in Weed Meadow, approximately 1.2 miles from the Emigrant Wilderness Boundary.

3.7.2.4. NORTHERN GOSHAWK

Management direction provided in the SNFPA is to delineate PACs surround all known or newly discovered breeding areas on the forest. The PAC would include the best 200 acres of forested habitat in the most contiguous patches possible. A Limited Operating Period (LOP) during the breeding season (February 15 through September 15) prohibits activities within ¼ mile of the nest site (or the PAC boundary if the nest site is not known), unless surveys confirm that the goshawks are not nesting.

Habitat Status

Optimal habitat for this species consists of mature conifer forest with dense canopy cover, interspersed with meadows or other open areas, and riparian areas (Zeiner et al 1990a). Nest stands are typically characterized by high canopy cover on gentle to moderate slopes with an open understory (USFS 2000). Goshawks feed on a variety of birds and mammals such as robins, Stellar's jays, squirrels, and chipmunks (Ibid), and has one of the most diverse diets of all of the North American raptors (Capen 1996). Prey is caught using a fast, searching flight or rapid dash from a perch along forest edges or through forest openings (ibid.). Because of visual limitations caused by dense forest environments, an open understory is necessary for detection and capture of prey (Fowler 1988, Reynolds et al. 1992). There is some low quality suitable habitat within the Emigrant Wilderness (Emigrant Wilderness Management Plan, 1998).

Species Account

There are 11 documented occurrences of goshawk within and near the boundary the Emigrant Wilderness prior to 1989. No surveys have been conducted within the Emigrant Wilderness (observation file Stanislaus National Forest, Sonora).

3.7.2.5. PALLID BAT

No specific management direction is given for the Pallid bat. FSM 2670.22 directs Forests to maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

Habitat Status

The geographic range of the Pallid bat is from western Canada to central Mexico. It is usually found in rocky, mountainous areas and near water. They are also found over more sparsely vegetated grasslands and they seem to prefer foraging in the open. Forage consists primarily of insects and they can consume half their weight in a day. They generally capture their prey on foliage or the ground making this a unique bat, as most capture prey on the fly. The bat has three different roost patterns, the day roost is usually in a warm, horizontal opening such as rock cracks or attics; the hibernation roost is often in caves, cracks in rocks, or buildings; and night roosts are usually open, near foliage. Very little is known about the status of this bat (Zeiner et. al.).

Species Account

It is unknown if this species occurs in the Emigrant Wilderness. No surveys have been conducted, but it is possible some habitat exists.

3.7.2.6. TOWNSEND'S BIG-EARED BAT

No specific management direction is given for Townsend's big-eared bat. FSM 2670.22 directs Forests to maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

Habitat Status

This bat species lives in a variety of communities including oak woodland, mixed conifer, riparian deciduous, and chaparral. They occupy medium to low elevations in the Sierra. Crevices in cliffs, trees, mines, tunnels, and buildings are suitable roosting sites. The bat uses a variety of separate roost sites for day, night, and hibernation. These sites need to be free of human disturbance, as the bat is extremely sensitive. A single disturbance may cause abandonment of a roost. Townsend's bat eats insects that it locates with echolocation. The primary prey species are moths (Zeiner et. al.).

Species Account

No surveys have been conducted for this species in the Emigrant Wilderness. Habitat for this species does exist, although no sightings have been noted.

3.7.2.7. WESTERN RED BAT

No specific management direction is given for Western red bat. Forest Service Manual 2670.22 directs forests to maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

Habitat Status

This species prefers riparian vegetation in low elevations consisting of deciduous trees such as cottonwood, sycamore, and willow, but they may range into forested habitats in the Sierra Nevada. The majority of sightings for this species are below 3,000 foot elevation; however,

Pierson et al. (2001) located individuals along Tioga road in Yosemite National Park, and at Tenaya Lake. These sightings, at approximately 8,000 feet elevation, are presumed to be solitary males or migrating individuals (*ibid.*). It typically is solitary and roosts in the foliage of trees or shrubs that have good over-canopy and sparsely closed canopy below, as the bat prefers to escape by dropping down for flight. Day roosts are usually in edge habitats along riparian areas, open fields, and orchards. This bat feeds later than most other species, 1-2 hours after sunset. Insects are their prey (Zeiner et. al.).

Species Account

No surveys have been conducted for this species in the Emigrant Wilderness. Habitat for this species does exist, although no sightings have been noted.

3.7.2.8. CALIFORNIA WOLVERINE

The SNFPA (2001) provides direction for management of wolverine. Upon detection of a wolverine, an analysis will be conducted to determine if activities within 5 miles of the detection have the ability to affect this species (*ibid.*). Pages 44-45 of the SNFPA contain more direction regarding wolverine. In addition, FSM (2670.22) direct forests to maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

Habitat Status

Preferred habitat for the wolverine is thought to be in late seral stage communities with moderate to dense canopy cover of mixed conifer, Jeffery pine, lodgepole, and red-fir forests, wet meadows, and montane chaparral at elevations of 6,500 to 11,000 feet. Wolverines prefer areas with low human disturbance and have home ranges that cover up to 150 square miles. They use caves, cliffs, hollow logs, rock outcroppings, and burrows for cover and nesting (Zeiner et. al.).

Species Account

Distribution and abundance of this species within the Emigrant Wilderness is mostly unknown. There are recorded sightings dating from 1932-1995. Surveys for the wolverine within the Wilderness have not been conducted, but in 1990 and 1992, winter surveys were conducted in the Stanislaus National Forest as part of a statewide cooperative study. Twelve camera-baited stations were established, but no wolverines were observed during the study (file Stanislaus National Forest). The primary foods of the wolverine are carrion and small mammal.

3.7.2.9. PACIFIC FISHER, AMERICAN MARTIN, AND SIERRA NEVADA RED FOX

The Forest Plan Amendment direction describes the desired future condition of fisher habitat as the following: areas surrounding den sites have at least two conifers greater than 40 inches dbh, at least one oak greater than 20 inches dbh with suitable denning cavities, and canopy cover exceeding 80 percent. The Forest Plan Amendment addresses the fisher in respect to management and retention of downed wood, snags, and old-forest habitats, but also requires protection surrounding any known or discovered den sites. The SNFPA designates a 700-acre buffer around verified fisher dens. A LOP applies to this buffer area and prohibits activities from March 1 to June 30. Additional direction concerning the

management of the Pacific fisher can be found on pages 43-44 of the SNFPA ROD (USDA Forest Service 2001b).

Desired future conditions for marten are described as at least two conifers per acre greater than 24 inches dbh with suitable denning cavities, canopy closure exceeding 60 percent, more than 10 tons per acre of coarse woody debris and an average of 6 snags per acre in the area surrounding den sites (SNFPA 2001). The SNFPA also designates a 100-acre buffer around verified marten den sites, with a LOP from May 1 through July 31. Additional direction can be found on pages 44-45 of the SNFPA (2001).

Sierra Nevada red fox denning area desired future conditions are described as large hollow logs distributed individually or in piles, access to underground burrows, and where possible areas of talus, scree or boulder slopes (SNFPA 2001). Upon detection of a Sierra Nevada red fox, an analysis will be conducted to determine if activities within 5 miles of the detection have the ability to affect this species (*ibid.*). Pages 44-45 of the SNFPA contain more direction regarding red fox.

The Stanislaus National Forest LRMP identifies furbearer management areas with road density standards and guidelines. Three furbearer management areas in the Stanislaus National Forest occur within or near the Emigrant Wilderness:

1. Furbearer Area #13 (Bell Meadow, 7,904 acres) – located southwest of the Emigrant Wilderness boundary
2. Furbearer Area #15 (Emigrant Lakes, 13,737 acres) – is adjacent and south of the Emigrant Wilderness
3. Furbearer Area #4 (Bourland Creek, 9,271 acres) – is adjacent and southwest of the Emigrant Wilderness boundary

Approximately 160 acres of Area #15 falls within the Emigrant Wilderness near Leopold Lake (Emigrant Wilderness Management Plan, 1998).

Habitat Status – Fisher

This species inhabits late seral stage mixed conifer, Douglas fir, montane hardwood conifer, ponderosa pine, lodgepole pine, and riparian habitats at elevations ranging from 4,000 to 8,000 feet in the southern Sierra. Dense canopied (60-100%), multi-storied, late seral stage stands are the preferred habitat types, especially in close proximity to riparian corridors (Zeiner et. al.).

Species Account – Fisher

Trackplate surveys were conducted in the Bell Meadow Furbearer Area #13 in 1990. This survey used Plexiglas coated with lampblack/ethanol solution and hair snares. This survey method does not meet regional protocol standards for furbearer surveys. No fishers were found during this survey (data on file Summit Ranger District). No surveys were conducted in the Emigrant Wilderness. There is low quality habitat for the fisher in the Emigrant Wilderness, as it is open and fragmented. Primary forage for the fisher is smaller mammals such as squirrels, rabbits, and mice. Population size and status is relatively unknown (Emigrant Wilderness Management Plan, 1998).

Habitat Status – Marten

Marten prefer habitats similar to fisher, but may tolerate conditions that are slightly more open. Marten are most commonly found at the higher elevations (4,000 to 13,000 feet) in red fir, lodgepole pine, and sub-alpine conifer habitats, although some sightings have been made in mixed conifer. Riparian corridors are used for foraging and travel (Zeiner et. al.).

Species Account – Marten

There were 28 recorded occurrences of marten within the Emigrant Wilderness from 1971-1991. Trackplate surveys were conducted in the Bell Meadow Furbearer Area #13 in 1990 and no marten were detected. Reports of marten occur frequently in most areas of the Emigrant Wilderness. A sub-adult was observed by this writer at Upper Buck Lake in October of 2002. Marten are voracious predators and eat squirrels, rabbits, marmots, voles, mice, birds, frogs, and toads to name a few. Population size and status is unknown, but appears to be relatively common (Emigrant Wilderness Management Plan, 1998).

Habitat Status – Sierra Nevada Red Fox

Very little information exists regarding suitable habitat for the Sierra Nevada red fox. Specific studies have not been conducted in the Sierras. Preferred habitat, in other parts of the state, is found in large, relatively unfragmented blocks of older forest characterized by dense (60-100% canopy closure), multi-storied structure, with a high number of large snags and downed logs. Denning sites are preferred in rock outcrops, talus slopes, downed logs, and stumps. High quality habitat also occurs in close proximity to dense riparian corridors that are used as travel ways and an interspersed opening with ground cover for foraging (Zeiner et. al.).

Species Account – Sierra Nevada Red Fox

There were two reported sightings of the Sierra Nevada red fox in the Emigrant Wilderness in 1991. Another was reported adjacent to the Emigrant Wilderness in Bell Meadow in 1990. The trackplate surveys in 1990 found no red fox tracks. The Sierra Nevada red fox is a predator that relies on small mammals, birds, and amphibians for food. Population size and status is unknown (Emigrant Wilderness Management Plan, 1998).

3.7.2.10. PEREGRINE FALCON

Habitat Status

Peregrines require vertical cliff habitats to nest successfully. They need to have large potholes or ledges that are inaccessible to land predators and are located near habitat that has high avian prey populations. In California, coastal areas and wetlands are select habitats. Peregrines do forage near forested habitats; however, it is not considered an essential habitat type for any stage of their life history (Zeiner et. al.). Suitable habitat exists in the Emigrant Wilderness.

Species Account

In 1990, a peregrine falcon was observed within 1.5 miles of the Emigrant Wilderness boundary. In 1991, a falcon was reported within the Wilderness. Surveys in 1993 confirmed

the presence of prairie falcons, but no peregrine falcons were observed (Emigrant Wilderness Management Plan, 1998). No further reports or surveys have been conducted.

3.7.3. Management Indicator Species (MIS)

The Stanislaus National Forest Plan lists Forest Management Indicator Species (MIS) that function as indicators, best reflecting the effects or changes in habitat associated with management activities. MIS species that are identified in the Forest Plan are discussed in this analysis.

The Forest Plan identified the species/species groups shown below as MIS.

Table 3-26 Management Indicator Species and Groups

Species	Scientific Name	Habitat
California Spotted Owl (S)	<i>Strix occidentalis occidentalis</i>	Late seral stage old growth ponderosa pine and mixed conifer
Northern Goshawk (S)	<i>Accipiter gentilis</i>	Moderately open late seral stage in conifers at varied elevations
American Pine Marten (S)	<i>Martes americana</i>	High elevation medium to late seral stage forests with riparian and small meadows
Pacific Fisher (S)	<i>Martes pennanti</i>	Late seral stages including old growth in mixed conifer in high elevation forests
Sierra Nevada Red Fox (S)	<i>Vulpes vulpes necator</i>	Forest interspersed with meadow
Wolverine (S)	<i>Gulo gulo</i>	Higher elevation conifer, mixed conifer, and montane chaparral
Willow Flycatcher (E)	<i>Empidonax traillii</i>	Wet meadows and willow stands
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Coniferous forest with standing dead trees
Mule Deer	<i>Odocoileus hemionus</i>	Meadow, riparian, and all forest seral stages
Western Gray Squirrel	<i>Sciurus griseus</i>	Black oak and live oak associations in mixed conifer and ponderosa pine
Riparian Bird Assemblages		Trees and scrubs in riparian zones next to streams and lakes
Oak Woodland Assemblages		Black oak in one or more seral stages
Conifer Bird Assemblages		Mature and older seral stage of mixed conifer
Meadow Edge Assemblages		Transition zone where forest and meadows meet
Resident Trout		Streams and lakes
Bald Eagle (T)	<i>Haliaeetus leucocephalus</i>	Open, mature, uneven stage forest close to lakes or large rivers
Great Gray Owl (S)	<i>Strix nebulosa</i>	Forest-meadow with abundant snags
Lahonton Cutthroat Trout (E)	<i>Salmo clarki henshawi</i>	Streams and lakes

(T) – Threatened, (E) – Endangered, (S) – Sensitive

Migratory birds are protected under the migratory conventions of the Migratory Bird Treaty Act (MBTA), (16 U.S.C., 703-711). Executive Order 13186, dated January 10, 2001,

requires federal agencies to comply with the conventions of the MBTA¹. This Executive Order requires federal agencies, such as the Forest Service, to integrate bird conservation principles, measures, and practices into agency activities and to avoid or minimize to the extent practical, adverse impacts on migratory bird resources when conducting agency actions. Migratory birds are grouped in assemblages for analysis and the species selected are representative of the assemblage.

Of the species shown in the table, the following have been listed as threatened and endangered under the Endangered Species Act: Bald eagle and Lahontan cutthroat trout. The project is outside the geographic range of the Lahontan cutthroat. The bald eagle is analyzed in Section 3.7.5. The great gray owl, Northern goshawk, Pacific fisher, Sierra Nevada red fox, and American marten are also listed as Sensitive and are analyzed in Section 3.7.5. The California spotted owl was determined in the BE to not occur in the Project Area and further analysis will not be done.

The remaining MIS species to be analyzed include Pileated woodpecker, mule deer, Western gray squirrel, riparian bird assemblages, black oak bird assemblages, meadow edge bird assemblages, and mature mixed conifer bird assemblages. Resident trout is addressed in Fish, Section 3.8. A state species of concern, golden eagle, is also analyzed.

3.7.3.1. PILEATED WOODPECKER

Habitat Status

Habitat should consist of dense, mature forests with large numbers of snags, stumps, and logs for cover. The woodpecker prefers areas with at least 40% canopy closure. Douglas fir and true fir forest are frequented more than other conifer types. Nesting is in dense stands of large (20 inches dbh) coniferous and deciduous snags and living trees of both types with dead limbs. It needs water close to the nesting site as it drinks copiously during the nesting season (Zeiner et. al.).

Species Account

There is no known or recorded sighting of the Pileated woodpecker in the Emigrant Wilderness. No surveys have been conducted. The required habitat may be too fragmented for a viable resident population.

3.7.3.2. MULE DEER

Habitat Status

Mule deer prefer a variety of habitats, especially meadows, riparian, and early forest seral stages. The Emigrant Wilderness is primarily a summer range with critical concentration areas in Horse Meadow, Cow Meadow, Cooper Meadow, Cooper Pocket and the Lower Relief Valley. Salt Lick Meadow, Spring Meadow, and Spring Creek are also identified as critical summer habitat. Habitat for deer in these areas consists of meadow for forage and hiding cover for does and fawns. Lodgepole stands are important for cover (Emigrant Wilderness Management Plan, 1998).

¹ Federal Register, Volume 66 (11), 01/17/2001.

Species Account

The mule deer is a common inhabitant of the Emigrant Wilderness during the spring months after snowmelt and stay until the heavier snows in the late fall. Wintering is done at lower elevations.

3.7.3.3. WESTERN GRAY SQUIRREL

Habitat Status

The squirrel is found in Black oak and live oak associations in mixed conifer and ponderosa pine forests (Zeiner et. al.).

Species Account

The Emigrant Wilderness may have some suitable habitat for this species in the lower elevations. None are near the proposed project area, but it is common throughout California in the suitable habitats.

3.7.3.4. RIPARIAN BIRD ASSEMBLAGES

Habitat Status

This bird assemblage has approximately 117 species. The following species are representative of the riparian bird assemblage: belted kingfisher, western wood peewee, American dipper, Warbling vireo, and the yellow warbler. The following table outlines the habitat needs of these species.

Species	Key Habitat Features
Belted Kingfisher	Usually excavates a burrow in a steep bank of sandy or other friable soil for nest, usually near water, but can be up to a mile away. Mainly prey on fish.*
American dipper	Fast water, streams, and rivers with rocky bottoms. Nests may be in crevices, stumps, and logs in/near the bank, usually within 3-6 feet of stream.*
Yellow warbler	Prefers small to large trees (>6-24 inch dbh), sparse to moderately dense (20-69% canopy closure) stands with shrub understory. Nest is above ground in deciduous sapling or shrub; gleans and hovers for insects and spiders.*
Warbling vireo	Prefers trees (>6" dbh), sparse to moderately dense (<70% canopy closure); frequents wooded areas with tall trees and shrub understory; gleans insects and spiders from foliage, sometimes flying insects.*
Western wood peewee	Prefers medium to large trees (>12"dbh); most numerous in woodlands and forests with sparse to moderate canopy cover, which border on meadows and streams. Feeds mostly on flying insects.*

*(Sauer et. al. 2003).

Species account

Riparian vegetation that exhibits multiple layers is the most utilized by this assemblage. There are 1,500 acres of wet meadow, over 100 lakes, and miles of stream. Most riparian streams are in narrow, steep rocky cascades of granite and boulders, except in valley bottoms where alluvial deposits exist. These streams are ephemeral, intermittent, and

perennial (Emigrant Wilderness Management Plan, 1998). There is a high capability for this assemblage within the Emigrant Wilderness. The California Breeding Bird Survey estimates general decline in most species in this assemblage (Sauer et. al. 2003).

3.7.3.5. BLACK OAK BIRD ASSEMBLAGES

Habitat and Species Account

This bird assemblage requires stands of conifer with a substantial amount of oak or stands that are predominately oak (Sauer et. al. 2003). Habitat of this characteristic is not found near the proposed project areas in the Emigrant Wilderness.

3.7.3.6. MEADOW EDGE BIRD ASSEMBLAGES

Habitat Status

There are over 60 species in this bird assemblage. The following species are representative of the Meadow Edge Assemblage: Red-breasted sapsucker, white-crowned sparrow, lazuli bunting, and olive sided flycatcher. The following table displays their habitat needs.

Species	Key Habitat Features
Red-breasted Sapsucker	Prefers large (>24" dbh), sparse to moderately dense (<70% canopy closure) stands, typically nests near stream or meadow; eats insects from holes drilled and under bark, sap, and cambium. Snag requirements are in the 1.5 snags/acre >10" dbh for maximum population.*
White Crowned Sparrow	Breeds in montane meadows and along stream courses with shrubs or conifers; seed eater, some insects; nests on ground or base of shrubs.*
Lazuli Bunting	Occupies open brushland and thickets of willow, tall weeds, vines and shrubs; eats insects and seeds from foliage or ground; nests above ground.*
Olive Sided Flycatcher	Prefers large tree (>24" dbh) stands; most numerous in montane, conifer forest where tall trees overlook canyons, meadows, lakes, or other open terrain; nests above ground; feeds on aerial insects, especially honey bees.*

*(Sauer et. al. 2003).

Species Account

The Emigrant Wilderness has numerous but small meadow habitats throughout. It is likely the meadow edge avian species use all these areas. Population trends, as estimated by the Breeding Bird Survey data analysis, show that there is a general decline in population, but they are not statistically significant at this time (Sauer et. al. 2003).

3.7.3.7. MATURE MIXED CONIFER BIRD ASSEMBLAGES

Habitat Status

There are approximately 91 species in this bird assemblage. The following species are representative: Stellar's jay, Cassins finch, mountain chickadee, pine siskin and the common raven. The Great gray owl and the northern goshawk are also represented in this assemblage and were addressed previously. The following table displays these species habitat needs.

Species	Key habitat Features
Stellars' Jay	Forest and woodlands in the Sierras, especially conifers; nests above ground on mud stick platforms usually built near trunks in small conifers; omnivorous feeders utilizing seeds, fruits, insects, bird eggs, and camp scraps.*
Cassins' Finch	Common montane resident, prefers tall open coniferous forest near meadows; nests in tall conifer exposed to sun; forages in meadow, openings on grass/forb seed, and often on conifer bud and seed.*
Mountain Chickadee	Common in interior mountains, frequents conifer/mixed forests, most numerous near meadows; nests in old cavities created by woodpeckers and decay; feeds on insects, spiders, and some seed.*
Pine Siskin	Prefers conifer and sub-alpine conifer habitats, frequent tall trees for nesting, roosting, and resting; nests above ground in dense foliage; feeds in riparian meadow and other herbaceous habitats on seeds and flower heads of herbs, coniferous buds; insects and spiders are common summer foods.*
Common Raven	Occurs in most habitats of California; is a omnivore that eats carrion, small invertebrates, insects, seeds, nuts, berries; nest are made of sticks and mud, old raptor nests and are found in cliffs and tall open trees.*

*(Sauer et. al. 2003).

Species Account

The Emigrant contains about 30% forested habitat and the Assemblage is likely to be found throughout the Wilderness. Population trends, as estimated by the Breeding Bird Survey data analysis, show there is a general decline in population trend of these species, except for the raven, but they are not statistically significant at this time (Sauer et. al. 2003).

3.7.3.8. GOLDEN EAGLE

Species Account

The golden eagle was once a common resident throughout the open areas of California. Numbers are now reduced near human population centers, but in general, they seem stable. However, this species natural densities are very low, its reproductive rate is low, it is at the apex of the food chain, and its large body size makes it a tempting target. It was estimated in the 1970s to have only a breeding population of about 500 pairs. Habitat destruction (reclamation of grasslands for agriculture), shooting, and human disturbance at nesting sites are their major threats. The eagle eats mostly rabbits and rodents, but feeds on other mammals and carrion as well (Zeiner et. al.).

Habitat Status

The eagle is generally associated with open terrain such as grasslands, desert, savannahs, and successional stages of forest and shrubland. The eagle's home range is fairly large, averaging 48 square miles in California. It usually nests in lofty cliffs, rock outcroppings, or large trees in open areas (Zeiner et.al.). It is likely the golden eagle soars above the Emigrant Wilderness looking for forage and could nest in the lower elevations, but there are no known sites in the Emigrant Wilderness.

3.7.4. Assumptions made in the Wildlife Analysis

3.7.4.1. CALIFORNIA WILDLIFE HABITAT RESOURCES

Information on animal species habitat was derived for the most part from the California Wildlife Habitat Resources website at www.dfg.ca.gov/hcpb. The following describes the sources of the life history information (California Dept. of Fish and Game 1999): Life History – The first page of this window displays the life history note taken from Volumes I (Amphibians and Reptiles), II (Birds), or III (Mammals) of "California's Wildlife" (Zeiner et al. 1988-1990). Most of these accounts have not been updated since their original publication; however, taxonomy and management status was updated for the database in July and August 1996 by CWHR Program staff. Updates will be made as resources allow.

3.7.4.2. BREEDING BIRD SURVEY DATA

The estimates of population trends from the Breeding Bird Survey (BBS) (Sauer et al. 2001) were used in this section for the different species selected for the riparian bird assemblage, meadow edge bird assemblage, and mature mixed conifer bird assemblage. The website for the population trend estimates includes the following data liability disclaimer, "Although these data have been processed successfully on a computer system at the United States Geological Survey (USGS), no warranty expressed or implied is made regarding the accuracy or utility of the data on any other system or for general or scientific purposes, nor shall the act of distribution constitute any such warranty. This disclaimer applies both to individual use of the data and aggregate use with other data. It is strongly recommended that these data be directly acquired from a USGS server, and not indirectly through other sources, which may have changed the data in some way. It is also strongly recommended that careful attention be paid to the contents of the metadata file associated with these data. The USGS shall not be held liable for improper or incorrect use of the data described and/or contained herein. These data are provided "as is" and without any express or implied warranties, including, without limitation, the implied warranties of merchantability and fitness for a particular purpose. Also, use of trade names or commercial products in this home page is solely for the purpose of providing specific information, and does not imply recommendation or endorsement by the U.S. Government. Sauer et al. (Ibid.) also caution, "The survey covers such a large area that regional differences in number and quality of survey routes are inevitable. Also, the count data collected in the survey are only indexes to the population, and the proportion of animals counted can differ among routes and observers." They also note "small sample sizes, low relative abundances on survey routes, imprecise trends, and missing data all can compromise BBS results."

Despite all the precautions, which must be used when examining BBS data, it remains the best source of population trend estimates for breeding birds.

3.7.4.3. SURVEY DATA

All survey data is on file is at the Stanislaus National Forest in Sonora, California. Exact locations of sightings may not be available to the public because of the need to protect sensitive species. The nature and scarcity of some species makes it extremely difficult to obtain accurate population estimates and conduct meaningful surveys. In these cases, if suitable habitat may exist in the planning area, the species was considered present.

3.7.5. Effects to Wildlife

INTRODUCTION

This section would describe the environmental effects of the alternatives on terrestrial wildlife. The evaluation uses a qualitative approach. Topics of concern identified that are based on management direction for National Forest lands include the protection of threatened, endangered, sensitive, and management indicator species and associated habitats. Suitable habitat for these species and the way it is affected by the alternatives is used as the qualitative criteria.

Detailed analysis of threatened and endangered species can be found in the Biological Assessment (BA), and a detailed analysis of Forest Service sensitive species can be found in the Biological Evaluation (BE). Migratory Bird and Management Indicator Species can be found in the Project Record.

RESPONSE TO ISSUES

The wildlife effects analysis addresses natural processes and whether or not they meet opportunity class goals outlined in the Emigrant Wilderness Direction. All of the lake dams and meadow dams lay within opportunity classes (OC) II-IV. The analysis of alternatives all fall within the guidelines of the OC objectives for Wildlife Habituation, which states, "Ecosystems are unaffected by human manipulation and influences so that plants and animals respond to natural forces" (see Forest Service Manual 2320.2) (Emigrant Management Direction, 2002, p. 11).

Localized human influences may have limited effects in...

- II very few areas
- III few areas
- IV some areas

Wildlife use patterns may show...

- | | | |
|-----|---------------------|---|
| II | brief, temporary | ...alterations due to human influences but are not permanently altered. |
| III | seasonal, temporary | |
| IV | Seasonal, temporary | |

A preliminary screening of terrestrial species was conducted in Section 3.7.1 and 3.7.2 to identify species to be included in this analysis. Wildlife species that are known to occur or likely to occur in the project area are the only species considered in further detail.

3.7.5.1. ALTERNATIVE 1 – PROPOSED ACTION

3.7.5.1.1. Direct and Indirect Effects:

Bald Eagle (Federally Threatened)

Suitable nesting habitat does not occur within the Emigrant Wilderness. In typical years, the lakes are frozen and the topography snow covered when the birds are courting, nest

building, and incubating eggs. The lakes in the Emigrant Wilderness appear to be used only as summer foraging habitat for resident birds.

The primary bald eagle activity areas, determined by observations, appear to be centered chiefly on the Emigrant Lake area, although sightings have also been made at Deer Lake, Snow Lake, and Relief Reservoir. Human activity around these lakes may cause an eagle to flush from a perch or cease hunting activity in the proximity of people. Snow Lake and Emigrant Lake dams are being proposed for repair and maintenance. Work on Emigrant Lake dam is expected to take no more than 10 days. Snow Lake dam repair is estimated to take 15 days. This activity is expected to cause little disturbance to the eagle. Repair of the dams would be beneficial to the fish population in the lake, as the eagle uses fish as a prey base. Fish populations would be more stable if lake dams were maintained than if the dams were allowed to deteriorate and the lake levels were lowered. No actions are proposed for Deer Lake or Relief Reservoir.

Mountain Yellow-legged Frog (Sensitive)

As determined in the BE, the repair, maintenance, and operation of 12 dams, and allowing 6 dams to deteriorate naturally, would have indirect effects on the mountain yellow-legged frog (MYLF).

Surveys have indicated that MYLF is closely associated in or near the following lakes and watersheds where management actions are proposed:

MYLF Present	
Dams Maintained	Dams Not Maintained
Huckleberry Lake Snow Lake Cow Meadow Lake Emigrant Lake Middle Emigrant Lake Long Lake Lower Buck Lake Y-Meadow Lake	Cooper Meadow Horse Meadow

There is a low possibility for dam maintenance activities killing individual MYLF. MYLF are rarely far from water, and escape to deep water when disturbed. Individuals could be killed or injured if rocks were dropped on them. Again, the possibility of this occurring is very low.

In the lakes supporting MYLF and with proposed repair and maintenance there would be no change in quantity of breeding, rearing, foraging, cover, or overwintering habitat. In lakes where the dams are not proposed for maintenance, a decrease in surface area would likely decrease the amount of shallow shoreline. Pope (1999) associated egg attachment sites with bedrock and emergent vegetation in relatively shallow water (0.2 m). Postmetamorphs and adults utilize warm, shallow (5-8 cm) shorelines for basking, foraging, and predator avoidance (USDA 2001, Jennings and Hayes 1994).

A decrease in lake size and volume would increase the degree to which inter- and intraspecific competition for aquatic resources occurs and potentially adversely affect

survival at multiple life stages. Competition for suitable egg attachment sites may reduce the total number of successful egg clutches, and tadpoles may encounter limitations on available foraging habitat. Adults have greater dietary reliance upon aquatic insects produced in the shallow shoreline zone (Jennings and Hayes 1994). A decrease in shoreline habitat would decrease production of prey species. Territorial behavior is not reported for the species. However, decreased lake size could increase the degree to which males compete for mates during underwater calling. Decreased lake depth increases the susceptibility of overwintering juveniles to winterkill associated with low tolerance to low oxygen tension (Bradford 1983).

During the calling and breeding season, displacement of individuals near repair and maintenance activities could occur and adversely affect the reproductive success of those individuals. Lowering the lake level during construction and repair activities could have an adverse effect on the amount (decrease) and suitability (no emergent vegetation) of shoreline habitat suitable for egg attachment. These effects would be of short duration (one breeding season). Recruitment failure of one year is likely within the range of natural variability for the species.

Indirect effects of increasing or maintaining artificially higher populations of trout in the lake, by retaining higher water levels and providing downstream flow augmentation to help fish reproduction, would continue to be detrimental to MYLF; however, the USFS does not regulate fish stocking and fish are a resource of the Wilderness as recognized by legislation. The status of MYLF is not expected to change because of the Proposed Action.

Surveys have indicated that MYLF is not associated in or near the following lakes and watersheds where management actions are proposed.

MYLF Not Present	
Dams Maintained	Dams Not Maintained
Bigelow Lake Leighton Lake Emigrant Meadow High Emigrant	Red Can Lake Bear Lake Yellowhammer Whitesides Meadow

Direct effects, including animal mortality and habitat destruction would not occur at the dams not maintained because natural deterioration would not involve human activity and maintenance on lakes with dams have no reported MYLF. Indirect effects may be beneficial to MYLF as lake levels on the un-maintained dams deteriorate over time. Horse Meadow, Cooper Meadow, and Whitesides Meadow are meadow maintenance dams. The remainder are natural lakes and would naturally impound water at a lower level. These lower levels may reduce the amount of habitat suitable for maintaining fish populations, resulting in decreased population size. Research has shown that predation by fish is a major cause of MYLF mortality (Jennings and Hayes 1994, Bradford, et al. 1998, Knapp and Matthews 2000. Mylfrog.com)., and with fish possibly declining or dying out, it is possible that MYLF could return to these lakes, as Matthews's research has also shown movement between lakes and ponds in watersheds. As the dams at meadow maintenance lakes and streamflow enhancement lakes deteriorate, it is possible that MYLF would benefit if existing fish populations are reduced or die out in the affected lakes and streams, as stream habitat is also utilized by the MYLF for reproduction and over wintering.

The OC objectives for Wildlife Habituation for the MYLF would be met in this alternative.

Yosemite Toad (Sensitive)

Repairing, maintaining, and operating 12 dams and allowing 6 dams to deteriorate naturally would have effects on the Yosemite toad (YT). Surveys have indicated that YT is closely associated in or near the following lakes and watersheds where management actions are proposed:

YT Present	
Dams Maintained	Dams Not Maintained
Emigrant Meadow Lake High Emigrant Lake Snow Lake Middle Emigrant Emigrant Lake	Whitesides

Direct effects on YT, including animal mortality and habitat destruction, may occur if maintenance personnel are not careful to avoid rodent burrows and water-filled depressions where YT may be. Indirect effects, such as avoidance of home ranges and/or reduced reproductive success, should not occur, as YT mainly utilizes perennial ponds and depressions for breeding and is more land-based than aquatic. The status of YT would not be expected to change.

Surveys have indicated that YT is not associated in or near the following lakes and watersheds where management actions are proposed:

YT Not Present	
Dams Maintained	Dams Not Maintained
Huckleberry Lake Bigelow Lake Cow Meadow Lake Long Lake Lower Buck Lake Y-Meadow Lake Leighton Lake	Cooper Meadow Lake Horse Meadow Lake Red Can Lake Bear Lake Yellow Hammer Lake

Direct effects, including animal mortality and habitat destruction should not occur, as no populations are known near these lakes. Indirect effects, such as exclusion from home range and/or reduced reproductive success, should not occur, as the species is not reported to be present. At the sites where the dams would be allowed to deteriorate, the YT may benefit and begin utilizing increased meadow habitats by lowering of lake levels over time and the exposure of more meadow habitat.

The OC objectives for Wildlife Habituation for the YT would be met in this alternative.

Great Gray Owl (Sensitive/MIS)

This species prefers forest-meadow combinations with abundant snags. No nest sites have been documented. Direct effects, including animal mortality and habitat destruction, would be highly unlikely. Indirect effects such as avoidance of home ranges and/or reduced reproductive success may occur temporarily during repair and maintenance activities. Care should be taken to avoid any nest sites if found. The lack of maintenance of some dams may increase meadow habitat over time and increase the owls preferred habitats.

The OC objectives for Wildlife Habituation for the great gray owl would be met in this alternative.

Northern Goshawk (Sensitive/MIS)

This species utilizes moderately open, late seral stage conifer forest in a range of elevations. There are no documented nesting or foraging occurrences within the Emigrant Wilderness boundary, but marginal habitat does exist. If birds are encountered, they may flush but no long-term effects should occur. If nest sites are found appropriate actions should be taken to protect the site

The OC objectives for Wildlife Habituation for the Northern Goshawk would be met in this alternative.

Pallid Bat, Townsend's Big-eared Bat, and Red Bat (Sensitive)

These bats have no recorded occurrence in the Emigrant Wilderness; however, as no surveys have been conducted, presence is assumed. They all utilize open meadow and water associated habitats for foraging. No impact to the bats is expected because no changes in habitat would occur and human disturbance would be in daylight hours.

The OC objectives for Wildlife Habituation for the two bats would be met in this alternative.

Wolverine, Pacific Fisher, Sierra Red Fox, American Martin (Sensitive/MIS)

All of these species inhabit the Wilderness and utilize a variety of habitats from riparian to alpine. Direct effects, including animal mortality and habitat destruction, would be highly unlikely. Indirect effects such as avoidance of portions of home range and foraging areas may occur during repair and maintenance activities. This disturbance would be of short duration (< 20 days) and should have no long-term negative effect on these species. Meadow habitats may increase as some dams deteriorate and add to foraging habitat.

The OC objectives for Wildlife Habituation for these four species would be met in this alternative.

Mule Deer (MIS)

The deterioration of the dams would increase meadow habitats and benefit foraging habitat for the deer. The activity associated with the repair and maintenance of dams may cause temporary flight and a change in daily routine, but since the time of disturbance would be very short, there would have no adverse effect to the deer.

The OC objectives for Wildlife Habituation for mule deer would be met in this alternative.

Riparian and Meadow Edge Bird Assemblages (MIS)

Birds may be disturbed temporarily by construction noise and visual disturbance from maintenance activities; however, these activities would not be expected to have any long-term influence on these bird assemblages. The repair and regulation of some dams may increase the active flow of streams for longer periods of the summer, benefiting riparian species such as the dipper. In areas where dams are not repaired or were allowed to deteriorate, meadow edge birds would have more meadow edge habitat available. The areas of impact are very small in relation to available habitats that the effect on bird assemblages would be negligible or non-existent.

The OC objectives for Wildlife Habituation for the riparian and meadow edge bird assemblages would be met in this alternative.

3.7.5.1.2. Cumulative Effects

The Emigrant Wilderness lakes receive a considerable amount of use by hikers and anglers. The eagles, using the lakes for foraging, have most likely become habituated to the presence of people and associated noise and activity disturbances. The presence of work crews during repair and maintenance for short periods would not add significantly to the disturbances eagles already experience.

The OC objectives for Wildlife Habituation for the bald eagle would be met in this alternative.

3.7.5.2. ALTERNATIVE 2 – NO ACTION

3.7.5.2.1. Direct and Indirect Effects:

Bald Eagle (Federally Threatened)

The deterioration of all dams would have little or no effect on the bald eagle. Natural deterioration would occur over a number of years (200 to 500 years in some cases) and return the lakes to natural levels. It is expected that fish populations would remain in these lakes either by natural reproduction or by artificial stocking. In addition, over 70 lakes within the Emigrant Wilderness have fish populations.

Mountain Yellow-legged Frog (Sensitive)

The non-maintenance of the dams would eventually return the lakes and watersheds to natural processes. MYLF may benefit by reduced fish populations in the lakes and by reduced reproductive ability of the trout in streams. The status of MYLF is not expected to change significantly because fish will most likely remain in the lakes without the dams but would likely have a better chance of survival with reduced populations of fish if that occurs.

The OC objectives for Wildlife Habituation for the MYLF would be met in this alternative.

Yosemite Toad (Sensitive)

YT could benefit by the return of natural processes by exposing more meadow habitat for foraging and natural flooding of meadow habitats that could provide shallow ponds for breeding.

The OC objectives for Wildlife Habituation for the YT would be met in this alternative.

Great Gray Owl (Sensitive/MIS)

The return of lake and stream levels to the natural condition over time would increase meadow habitats by approximately 90 acres and potentially create more suitable foraging habitat for the owl. This additional meadow is very small in relation to what is available now and no noticeable effect would be seen.

The OC objectives for Wildlife Habituation for the great gray owl would be met in this alternative.

Northern Goshawk (Sensitive/MIS)

Since there would be no change to the habitat for this species and no activities would occur to create disturbance, there would be no effect to Northern goshawk from Alternative 2.

Pallid Bat, Townsend's Big-eared Bat, and Red Bat (Sensitive)

The bats may benefit by the creation of more meadow habitats for foraging as dams deteriorate and lake levels fall. This additional meadow is very small in relation to what is available now and no noticeable effect would be seen.

The OC objectives for Wildlife Habituation for these bats would be met in this alternative.

Wolverine, Pacific Fisher, Sierra Red Fox, American Martin (Sensitive/MIS)

As lake levels decrease, meadow habitats may increase and provide additional foraging habitats. This additional meadow is very small in relation to what is available now and no noticeable effect would be seen.

The OC objectives for Wildlife Habituation for these four animals would be met in this alternative.

Mule Deer (MIS)

The natural deterioration of the dams would expose more meadow habitat, which would increase foraging areas for the deer. The exposure of more meadow is very small in relation to what is available now and no noticeable effect would be seen.

The OC objectives for Wildlife Habituation for mule deer would be met in this alternative.

Riparian and Meadow Edge Bird Assemblages (MIS)

More meadow habitats would be exposed after dam deterioration and meadow species may benefit. Riparian species may lose some stream flow in dry years in the watersheds when

no regulation of flow takes place; this is a common natural occurrence in the Sierras. These impacts would be negligible and difficult to measure.

The OC objectives for Wildlife Habituation for the riparian and meadow edge bird assemblages would be met in this alternative.

3.7.5.2.2. Cumulative Effects

There would be no cumulative effects associated with this alternative.

The OC objectives for Wildlife Habituation for the bald eagle would be met in this alternative.

3.7.5.3. ALTERNATIVE 3 – HISTORIC

3.7.5.3.1. Direct and Indirect Effects:

The effects to this alternative would be similar to Alternative 1.

3.7.5.3.2. Cumulative Effects

The effects to this alternative would be similar to Alternative 1.

3.7.5.4. CUMULATIVE EFFECTS

Between 1925 until 1951, 12 streamflow maintenance dams, 3 lake level dams and 3 meadow maintenance dams were built in the Emigrant Wilderness. The purpose of the dams was, in part, to enhance the introduced fisheries. The creation of these dams and the subsequent stocking of fish into an ecosystem naturally void of fish resulted in the loss and creation of meadow habitat for the YT and increased predation on the MYLF. It should be noted that declining amphibian populations are not unique to the Emigrant Wilderness, but are global in scale and are thought to be a combination of human-made and natural causes, such as pesticides, acid rain, increases in ultraviolet radiation, habitat destruction and viruses. To provide a complete view of the effects, a watershed view is provided below. The repair and maintenance of dams would not contribute to additional losses to any species.

3.7.5.4.1. Alternative 1 – Proposed Action

North Fork of Cherry Creek

All dams in this watershed would be repaired and operated as they have for the past 50 years. Cow Meadow Lake is currently without a dam and reconstruction would inundate meadow habitats that appear to be recovered from previous flooding. Some species may be temporarily displaced by reconstruction activities and changes/loss in meadow habitat would occur in Cow Meadow. This alternative could adversely affect MYLF in Cow Meadow by increasing fish habitats.

East Fork of Cherry Creek

All dams in this watershed except Horse Meadow are to remain and be operated as they have for the past 50 years. Some species may be temporarily displaced by reconstruction activities but no changes in habitat would occur. This alternative would not adversely affect

any population or habitat and may benefit YT and MYLF in the Horse Meadow area by increasing meadow habitat and possibly reducing fish populations in the creek.

West Fork Cherry Creek

All dams in this watershed are to remain and be operated as they have for the past 50 years. Some species may be temporarily displaced by reconstruction activities but no changes in habitat would occur. This alternative would not add adverse affects on any population or habitat.

Middle Fork Cherry Creek

Only Leighton Lake dam would be repaired, maintained, and operated in this watershed. Some species may be temporarily displaced by reconstruction activities near Leighton Lake and more meadow habitat would become available for meadow species at Red can Lake as the dam deteriorates and natural lake level returns. This alternative would not adversely affect any population or habitat.

Lily Creek

The repair maintenance and operation of Y-Meadow dam and the deterioration of Bear Lake may temporarily displace some species by reconstruction activities but no noticeable changes in habitat would occur. This alternative would not adversely affect any population or habitat.

Upper South Fork Stanislaus

This alternative allows both meadow maintenance dams to deteriorate. They are currently in a deteriorated condition and no noticeable change to terrestrial habitat is expected to occur and no activities would take place.

3.7.5.4.2. Alternative 2 – No Action

North Fork of Cherry Creek

A reduction in lake levels over time would increase the amount of meadow habitat for the YT, great gray owl, bats, meadow edge bird assemblages, and deer. The possibility of loss of spawning and over-wintering habitat for fish may decrease the predation on MYLF, by lowering fish population recruitment and survival.

East Fork of Cherry Creek

A reduction in lake levels over time would increase the amount of meadow habitat for the YT, great gray owl, bats, meadow edge bird assemblages, and deer. The possibility of loss of spawning and over-wintering habitat for fish may decrease the predation on MYLF by lowering fish population recruitment and survival.

West Fork Cherry Creek

The deterioration of these dams could result in the loss or reduction of fish populations in both lakes and Buck Meadow Creek. This would be beneficial to the MYLF by reducing predation by fish. There is currently a wide distribution of MYLF within the watershed,

Coolidge Meadow to Deer Lake. Meadow habitat would increase as the dams deteriorate and be possibly beneficial to the great gray owl, bats, meadow edge bird assemblages, and deer.

A reduction in lake levels over time would increase the amount of meadow habitat for the great gray owl, bats, meadow edge bird assemblages, and deer.

Lily Creek

Significant change to habitat would occur very slowly if these dams are allowed to deteriorate. Y-Meadow dam would take many years to fail because of its size and construction. When it does, more meadow habitat may become available to meadow dependent species such as Great gray owl, deer, and meadow-edge bird assemblages¹.

The dam failure and possible lack of more than seasonal flows could reduce or eliminate the fish populations in Lily Creek and Bear Lake. This would benefit MYLF by reducing predation mortality if some flow continues out of Lily Creek without the dam.

Upper South Fork Stanislaus

Similar to Alternative 1

3.7.5.4.3. Alternative 3 – Heritage

North Fork of Cherry Creek

The deterioration of High Emigrant and Middle Emigrant would increase the amount of meadow habitat for YT, Great gray owl, bats, meadow edge bird assemblages and deer. Decreased flows from those two dams and deterioration of Cow Meadow dam could benefit MYLF by the loss of spawning habitat and possible winter mortality of fish.

East Fork of Cherry Creek

Similar to Alternative 2

West Fork Cherry Creek

Same as Alternative 1

Middle Fork Cherry Creek

Same as Alternative 1

Lily Creek

Similar to Alternative 2

Upper South Fork Stanislaus

Similar to Alternative 1

¹ As noted in Watershed (3.1.3.2.1 Direct and Indirect Effects in the Clavey River watershed), the natural meadow appearance and function would not be expected to return to pre-dam conditions, even after the dam deteriorates completely.

3.8. FISH

3.8.1. Introduction

Historically, nearly all lakes above 6,000 feet in the Sierra Nevada mountain range were fishless. Since the 1870s, most of the high elevation lakes in California (primarily in the Sierra Nevada range) capable of supporting fish have been stocked with trout, including 63% of lakes over 1 ha (2.47 acres) (Knapp 1996). Up to 85% of such lakes have been stocked in National Forests (Knapp 1996). Four species of trout are now found within the Emigrant Wilderness: rainbow trout (*Oncorhynchus mykiss*), Eastern brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), and golden trout (*Oncorhynchus mykiss aguabonita*). Of these species, rainbow trout and brook trout occur within the project area.

Trout are stocked by California Department of Fish and Game (CDFG) within the Emigrant Wilderness project area. Although fish stocking is outside the scope of this analysis, data from Yosemite National Park indicate that fish populations could persist in many of the Emigrant lakes without stocking. Yosemite is on the southern border of the Emigrant, and is similar in elevation, geology, and snow pack dominated spring runoff.

Yosemite National Park began to phase out stocking in 1977 and ended the practice altogether by 1991. In 1977, a survey of 102 lakes stocked between 1963 and 1977 was conducted in Yosemite to determine the fish population status (Botti, 1977). Approximately two-thirds of those lakes were expected to remain self-sustaining over the long-term despite cessation of stocking.

3.8.2. Brook Trout (BT)

Brook trout are native to the eastern United States and Canada. They have been introduced and are sustaining in most western states. Brook trout spawn in the fall, typically in streams, although they can spawn in lakes in areas of spring upwelling. They are opportunistic sight feeders that eat bottom dwelling and drifting aquatic macroinvertebrates and terrestrial insects (Raleigh 1982). This statement from "Trout of California" (Wales 1957) documents the rationale for stocking Eastern brook trout into the mountains of the Sierra Nevada:

This trout is particularly well fitted for life in those mountain lakes of California which have no permanent tributary streams in which fish can spawn. The eastern brook trout does not require stream water and can spawn very successfully in springs on lake bottoms. Most lakes have some such springs and an initial planting of fingerlings is often enough to establish the fish; from then on, natural propagation may be sufficient.

Upwelling springs may be more important than substrate to brook trout for spawning site selection (Raleigh 1982).

Adams and others (2001) reported on the ability of brook trout to disperse downstream through steep gradients and waterfalls when stocked into headwater streams or lakes. Brook trout dispersed downstream from source populations through maximum channel slopes of 80% and waterfalls up to 18 meters (59 feet) high. One record of a brook trout

from Bunny Lake, California was aged at 19 years old (Wales, 1957). This suggests individual populations may withstand several years of poor spawning conditions.

3.8.3. Rainbow Trout (BT)

Rainbow trout are native to California and are the fish most commonly raised in the trout hatcheries of California. Rainbow trout have been stocked into nearly every suitable California lake or stream (CDFG, 1966). Females generally mature in their third year, while males mature in their second or third year. They spawn in streams from January to July (Raleigh et al., 1984). Rainbow trout are opportunistic feeders, with diets consisting mostly of aquatic insects. During the summer, 40 to 50 percent of their diet in headwater streams may be terrestrial insects. During winter months in lakes, 83 to 94 percent of their diet is composed of bottom fauna (Raleigh et al., 1984).

3.8.4. TROUT HABITAT

Rainbow and brook trout require the same habitat types. Riverine habitat is characterized by clear, cold water; silt-free rocky substrate in riffle and run areas; a pool-to-riffle ratio of 1:1; well vegetated, stable stream banks; abundant instream cover; and relatively stable annual water flow and temperature regimes (Raleigh, 1982, Raleigh et al., 1984, and Raleigh et al., 1986). Lacustrine habitat for trout is characterized by clear, cold, deep lakes that are typically oligotrophic (Raleigh, 1982, Raleigh et al., 1984, and Raleigh et al., 1986).

There are also some differences in habitat requirements for these species. According to Raleigh et al. (1986), in rivers, brook trout tend to occupy the less fertile, headwater region, rainbow trout the mid-region with intermediate habitat conditions, and brown trout the deeper, lower velocity, warmer, more fertile downstream region. Table 3-27 compares the specific habitat requirements for each species.

Table 3-27 Habitat Requirements of Resident Trout

Characteristic	Rainbow	Brook
Temperature Range (°F)	32-73	32-75
Temperature Optimum (°F)	54-64	52-61
pH Range	5.5-9.0	4.0-9.5
pH Optimum	6.5-8.5	6.5-8.0
Focal Point Velocity ("/sec.)	3.9-5.5	2.8-4.3
Instream Cover (%)	≥25	≥25
Velocity over Redds ("/sec.) Range	0.4-36.2	
Velocity over Redds ("/sec.) Optimum	11.8-27.6	

3.8.5. Fish Stocking

CDFG manages fish populations and the stocking program in the Emigrant Wilderness. Table 3-28 lists species and typical stocking frequency of lakes in the Emigrant. Stocking is undertaken to maintain populations for recreational angling. Where more than one species is present, the species marked with a single asterisk (*) is stocked. Many lakes lack good stream spawning habitat. Lakes marked with two asterisks (**) are considered self-sustaining for rainbow trout. Brook trout are capable of lake spawning in many Emigrant

lakes. Detailed reproduction and productivity data are not available for most Emigrant waters.

Table 3-28 Stocking and Stocking Frequencies

Lake	Species Present or Stocked in Past	Average Stocking Frequency	Amphibian Resources
Cherry Creek Watershed – East Fork Cherry Creek			
Snow Lake**	RT*/BT*	1-3 yr.	Habitat for MYLF
Bigelow Lake	RT/BT	Annually stock RT	
Horse Meadow**	BT	No stocking	
Huckleberry Lake**	RT*/BT	Variable	MYLF
Cherry Creek Watershed – North Fork Cherry Creek			
High Emigrant Lake	RT/BT	Every 1-2 years	YT
Emigrant Meadow**	RT/BT	No stocking	YT ¹
Middle Emigrant Lake**	RT/BT	No stocking	MYLF in Summit Meadow
Emigrant Lake**	RT/BT	No stocking	Habitat for MYLF
Cow Meadow Lake**	RT/BT	No stocking	Habitat for MYLF ²
Cherry Creek Watershed – Middle Fork Cherry Creek			
Red Can Lake**	RT	1 yr.	
Leighton Lake	RT	Every 1-2 years	
Yellowhammer	RT	Annually	
Cherry Creek Watershed – West Fork Cherry Creek			
Long Lake	RT	Annually	Riparian habitat for MYLF below dam
Lower Buck Lakes	RT	1 yr.	MYLF
Clavey River Watershed – Lily Creek			
Y-Meadow	BT	No fish	MYLF below lake
Bear Lake**	RT	No stocking	
South Fork Stanislaus River Watershed – South Fork Stanislaus River			
Cooper Meadow	BT	No stocking	
Whitesides Meadow	No fish reported		YT

3.8.6. Other Aquatic Organisms

The spinytail fairy shrimp (*Streptocephalus sealii*), native and common to California and many other states, is present in Y-Meadow Lake.

In their proposed rule for endangered species status for the southern California distinct vertebrate population segment of the mountain yellow-legged frog, the U.S. Fish and Wildlife Service (1999) concludes of stocking rainbow trout into high mountain lakes: "Wherever the two species co-occur, trout are likely to eliminate mountain yellow-legged frogs or keep populations low and limit dispersal." In October 2000, the U.S. Fish and Wildlife Service published a 90-day finding on a petition to list the mountain yellow-legged frog as an endangered species. Part of their rationale was as follows:

¹ Yosemite toad

² Mountain yellow-legged frog

The introduction of nonnative fish, including rainbow trout (*Oncorhynchus mykiss*), is one the best documented causes of decline of Sierra Nevada Mountain populations of mountain yellow-legged frogs. Careful study of the distributions of introduced trout and mountain yellow-legged frogs for several years has shown conclusively that introduced trout have had negative impacts on mountain yellow-legged frogs over much of the Sierra Nevada Mountains (Bradford 1989; Knapp 1996). Bradford (1989) and Bradford et al. (1994) concluded that introduced trout have eliminated many populations of mountain yellow-legged frogs. In addition, the presence of trout in intervening streams sufficiently isolates other frog populations so recolonization after stochastic (random, naturally occurring) local extinctions is essentially impossible. This mechanism is sufficient to explain the elimination of mountain yellow-legged frogs from the majority of sites they once inhabited in the Sierra Nevada Mountains.

Listing of the MYLF as an endangered species could affect Emigrant fisheries future resources since activities identified by the U.S. Fish and Wildlife Service that may result in a violation of Section 9 of the Act include introduction of non-native species that compete or hybridize with, or prey on, MYLFs.

3.8.7. Effects to Fish

Trout require water within a specific temperature and oxygen saturation range to grow, reproduce, and survive environmental stress (See Table 3-27). Management actions that increase discharge to streams during the late summer low flow periods in the Sierras (e.g., storage and release of water) are generally good for fish survival and carrying capacity. Beneficial effects of seasonally increased discharge continue downstream and act cumulatively.

In general, increased habitat availability will increase carrying capacity, although habitat quality and complexity (i.e., cover, food availability, thermal regimes, etc.) will affect the suitability of habitat for fish. Management actions that increase or maintain surface area of stream or lake habitat are generally good for fish survival and carrying capacity; however, changes in depth or surface acreage may not be comparable between lakes. Where cover is limiting, an increase in vegetated shoreline may have a greater affect than an area of open water. Where temperature or oxygen are limiting, increased depth may benefit fish more than increased area.

Fish population dynamics are also affected by stocking. While fish stocking is considered outside the scope of this analysis, it is assumed that stocking by CDFG will continue throughout the project area.

The release of water from an impoundment increases streamflow and recharges downstream lakes, but during dry periods of the year, there is a gradual reduction in the size of impounded lake rearing habitat. The effects to fish from the management alternatives are analyzed relative to the existing situation. For most lakes, the existing condition is that leakage and/or unregulated release of water through a valve gradually meters out water. During dry months, the lakes are gradually drawn down then refill during wet months. Since lake levels are dependent on annual precipitation and runoff, in addition to leakage or release of impounded water, the effects to fish populations from impoundments must be analyzed in relative terms.

Dams may interrupt movement of fish and other aquatic organisms. In naturally fragmented habitat such as that which occurs in many steep areas of the Sierras, upstream movement of aquatic organisms is limited. Where stream gradients are low to moderate, there may be seasonal upstream movements to feed, spawn, seek cool water (thermal shelter), avoid entrapment in a drying bed, avoid predators, etc. Carrying capacity gained by impounded water or surface acreage may be partially offset by losses due to habitat fragmentation by damming.

Dams may provide a refuge from fish predation on amphibians. Dams may also stop the spread of aquatic invasive species. Amphibians and enclaves of native rainbow trout may be protected from connection to other populations.

CDFG has designated the Clavey and a portion of the Middle Fork Stanislaus River as Wild Trout Streams to protect and enhance the aquatic habitat and to provide quality angling without supplemental stocking. The Wild and Scenic River Study conducted for the Stanislaus National Forest Plan Environmental Impact Statement for the Stanislaus National Forest Plan describes the fisheries resources of the Clavey River Segment: 3 Bell Creek/Lily Creek - 3N01.

One of the first streams in California to be designated as a Wild Trout Stream, representing a mid to low elevation trout stream in a remote location. Wild Trout streams provide self-sustaining trout fisheries which are not supplemented by hatchery stocking. It is believed that almost the entire basin contains only fish "native" to this portion of the Sierra Nevada. About 95% of the basin has an original fish assemblage. Rainbow trout is the only trout species in the basin (Lily Creek is reported to have some brook trout and brown trout may spawn at the confluence with the Tuolumne River). Rainbow trout are found in all of the Clavey and its tributaries capable of supporting coldwater fish. The lower portion of the Clavey also contains a native assemblage of warm water fish including Sacramento suckers, Sacramento squawfish and hardhead.

Due to extensive planting of non-native trout species and the illegal introductions of non-native warm water fish species, few other streams in the Sierra contain only the original assemblage of fish species. The Clavey River may be the only "rainbow trout" river left, in the Sierra Nevada, with its original fish assemblage still intact and relatively unaffected by introduced species.

Unless otherwise stated, fish populations are likely to persist under each alternative through either self-sustaining reproduction or ongoing CDFG fish stocking.

RESPONSE TO ISSUES

The fisheries effects analysis addresses two significant issues identified during the public scoping process: Natural Processes and Social/Economic issues. Reconstruction, repair, maintenance, and operation of dams in the Emigrant Wilderness may alter (or have already altered) natural processes, including sediment transport, streamflow regimes and natural lake levels, as well as modify vegetation, riparian habitat, and the habitat of fish and other aquatic organisms. Dams may further reduce connections between stream and lake habitat in the already highly fragmented Sierra aquatic ecosystem.

There is concern that the loss of dams would negatively influence the local recreation-based economy. Less water in the lakes could mean less fish for anglers. This socio-economic issue is addressed indirectly by expected changes in the population dynamics of the fish community. In general, alternatives that sustain or increase the numbers of fish or maintain/increase the potential for fish to grow to a larger size (increased growth and survival), increases the quality of the angler experience and supports recreation as a socio-economic base. See 3.6 Recreation and 3.10 Social and Economic for additional information related to this issue.

3.8.7.1. ALTERNATIVE 1 – PROPOSED ACTION

3.8.7.1.1. Direct and Indirect Effects

East Fork Cherry Creek

Snow Lake

Snow Lake dams would be restored and maintained under this alternative. Snow Lake has self-sustaining populations of both brook and rainbow trout. The dams are intact, however; the control valve does not function. The gradual release of water from leakage contributes to downstream flows. Dam repair and flow management would enable additional water to be released during summer low flows to increase survival and carrying capacity of fish in the headwaters of the East Fork of Cherry Creek. The effect to fish would be greatest near the lake and immediately downstream. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present leakage with consequent loss of lake rearing habitat. The maximum depth loss would be 10 feet and surface area loss would be 8 acres from full capacity. Flow increases would maintain or increase downstream habitat due to greater wetted surface and depth.

Bigelow Lake

Bigelow Lake dams would be restored and maintained under this alternative. Bigelow has populations of brook and rainbow trout, although rainbow trout are not self-sustaining. In 1999, anglers also reported harvesting brown trout, but their presence has not been confirmed by CDFG surveys. Rainbow trout have been stocked annually. Brook trout were last stocked in 1972. They are now self-sustaining.

The dams are intact, however; the control valve does not function. The gradual release of water from leakage contributes to downstream flows. Dam repair and flow management would enable additional water to be released during summer low flows to increase survival and carrying capacity of fish in the headwaters of the East Fork of Cherry Creek. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present leakage, with consequent temporary loss of lake rearing habitat. Stream habitat would increase slightly due to greater wetted surface and depth from increased flow. CDFG biologists believe water temperature on East Fork of Cherry Creek between Horse Meadow and Huckleberry Lake may respond in part to the volume of release from Snow Lake and Bigelow dams (Kelly et al., 1999). Lower releases may result in higher water temperatures.

Horse Meadow

The Horse Meadow dams would not be maintained under this alternative. Horse meadow has a self-sustaining population of brook trout. The dam has trapped streambed load and the impoundment has filled with sediment. Under this alternative, the dam would continue to deteriorate. Sediment that has accumulated behind the dam would scour and the grade would gradually cut down to the historic channel. As the channel degraded, there would likely be a loss of rearing habitat and some reduced carrying capacity of fish until the channel stabilized. There may be a reduction in the number of aquatic invertebrates during times of rapid channel change. The redistribution of sediment could cause a temporary reduction of pool habitat and increased sedimentation in low gradient riffles upstream from Huckleberry Lake. Over time, the accumulated sediments would move downstream and deposit into Huckleberry Lake. The duration and intensity of these possible effects to aquatic resources is largely dependent on the magnitude of changes in the dam. Small changes would result in less release of sediment and minor (perhaps immeasurable) changes in habitat. A collapse of the dam would likely result in a noticeable slug of suspended sediment and bed material moving downstream, and changes in pool frequency and depth.

Huckleberry Lake

Huckleberry Lake dams would be restored and maintained under this alternative. Brook trout and rainbow trout are self-sustaining in the lake, inlet, and outlet streams. The dams are intact, however; the control valve does not fully function. The gradual release of water from leakage and the partially opened flow control valve contribute to downstream flows. Dam repair and flow management would enable additional water to be released during summer low flows to increase survival and carrying capacity of fish in East Fork of Cherry Creek. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present unmanaged flow, with consequent loss of lake rearing habitat. At full capacity, the impoundment adds 25 acres to the natural lake surface size. Stream habitat would increase slightly with greater wetted surface and depth from increased flow. Sediment retained behind Horse Meadow dam would eventually be transported downstream and deposit at the inlet to Huckleberry Lake.

North Fork Cherry Creek

High Emigrant Lake

High Emigrant Lake has been stocked with rainbow trout on most years since 1950. The rainbow population in the lake is not self-sustaining. Brook trout have been reported from both the lake and stream and are presumed self-sustaining since there are no recent stocking records. Unconfirmed rainbow trout/golden trout hybrids have been reported from the outlet stream in addition to rainbow trout.

The High Emigrant control valve does not function, however; the gradual release of water from the High Emigrant impoundment through leakage contributes to downstream flows. Although surface flow is discontinuous between High Emigrant and Emigrant Meadow, trout reside just downstream from the dam. The release of impounded water from High Emigrant is considered by CDFG to be important to successful spawning of trout in Emigrant Meadow Lake. Under this alternative, the dam and control valve would be restored, and potentially more of the storage capacity could be used to augment downstream flow. This would

increase the area of wetted streambed and connectivity between High Emigrant and Emigrant Meadow Lakes and improve intergravel flow for spawning.

Flow management at High Emigrant, in concert with streamflow maintenance dams at Emigrant Meadow, Middle Emigrant and Emigrant lakes, cumulatively impacts fisheries at Emigrant Lakes and downstream through the North Fork Cherry Creek watershed.

Emigrant Meadow Lake

Emigrant Meadow Lake was stocked with rainbow trout in 1988 and 1989 and the rainbow trout have been self-sustaining since that time. Brook trout are also present and self-sustaining. The reservoir provides sufficient storage and release of water to support natural reproduction at Emigrant Lake spawning areas. The cumulative storage and release of water from the four Emigrant dams was considered sufficient to provide "a minimum flow of 80 miners inches or more, the full distance to the junction of Cherry and Elinor Creeks." (Cherry Creek Development – Historical).

Water flows through a gate valve at the dam, augmenting summer and early fall discharge in the stream between Emigrant Meadow Lake and Middle Emigrant Lake. Under this alternative, the dam and gate would be maintained in their present good condition. The reservoir surface elevation would remain the same, thus there would be no change in the carrying capacity to lake rearing fish. The release of stored water would continue to augment downstream flow. With managed flow regulation, potentially more of the impounded water could be released to downstream fisheries. If more water is released, the lake may be drawn down further than at present during dry years and lake carrying capacity may decline. Conditions in the stream for spawning and rearing fish would be improved.

Middle Emigrant Lake

Middle Emigrant Lake has a self-sustaining run of both rainbow trout and brook trout. The repair of Middle Emigrant Lake dam would raise the impoundment 3 feet at full capacity. The lake acreage would be restored to the previous impoundment level of 25 acres. The increased storage potential would increase the volume of water available for release to the outlet stream. The flow control valve would be managed to release the added storage capacity. Fish survival and carrying capacity would be increased in both the lake and outlet stream due to improved spawning and rearing conditions.

Emigrant Lake

Emigrant Lake has a self-sustaining run of both rainbow trout and brook trout. This alternative would include the repair of the flow control valve that would enable a more complete use of the Emigrant Lake reservoir water storage and release capability. Dam repair and flow management would enable increased discharge to augment summer flows and increase survival and carrying capacity of fish in the North Fork of Cherry Creek. The effect would be most notable above the confluence with the East Fork of Cherry Creek. The effects to fish along these 6.8 miles of stream would be increased stream surface area, increased depth, possibly cooler stream temperatures and increased oxygen concentrations, and a reduction in habitat isolated during periods of ephemeral flow (improved connectivity). Increased flow may result in increased spawning success and egg to fry survival.

Flow management and release of stored water would gradually draw down Emigrant Lake during the late summer and early fall. If all impounded water were released, the surface area of the lake would diminish in elevation by 9 feet. Fifty surface acres of lake rearing habitat would be to the level of the flow control valve, or the pre-dam lake level. The existing uncontrolled water release generally does not result in the release of all impounded water.

Cow Meadow

The main dam was destroyed by storm events and the existing condition is the natural lake level. Rainbow trout and brook trout are no longer stocked, but currently reproduce naturally in the stream. Reconstruction of the dam and flow control valve would raise the lake level three feet. The maximum depth would increase from 33' to 36', and 18 acres would be added to the surface area. There would be a net benefit to fish primarily through the increase in rearing habitat. There may be a temporary boost in food availability from newly flooded riparian vegetation. The added depth may provide additional over-wintering habitat.

Some loss of stream habitat would occur as the impoundment rose to capacity. There would be a loss of connectivity between the lake and downstream fish due to the dam blocking movement of fish. This may reduce over-wintering habitat for fish that move upstream into the lake to over-winter.

Middle Fork Cherry Creek

Red Can Lake

Red Can Lake is stocked annually with rainbow trout and is self-sustaining. Should the dam fail due to lack of maintenance, one acre of pond habitat (13%) would revert to stream habitat. Effects to fish would be minimal.

Leighton Lake

Leighton Lake is stocked with rainbow trout every 1-2 years. The rainbow trout are not self-sustaining. The dam is present, but the porosity of the dam prevents complete impoundment of water. During dry periods, the lake surface elevation drops below the outlet.

The integrity of the dam and its ability to store water would be accomplished by repairing and maintaining the dam. This would prevent lake volume from depleting as rapidly, allowing for a prolonged period of maximum depth in the summer. This would be beneficial to lake fish, as the greater lake volume would buffer changes to oxygen and temperature. The effects to stream fish would be the same as the existing condition. Although the repair and maintenance of the dam would allow for the controlled release of water, the dam's current porosity has allowed for the release of water downstream.

Yellowhammer Lake

Rainbow trout are stocked into Yellowhammer Lake annually, but are not self-sustaining. The dam is present, but the porosity of the dam prevents complete impoundment of water. The dam slows release of water during wet periods and temporarily elevates the lake to the impoundment size of 20 acres. As the dam further deteriorates, seasonal flooding would diminish. Without this seasonal flooding, the potential expansion of 2 acres of rearing

habitat that may provide a short-term nutrient boost to fish and aquatic organisms would be lost.

West Fork Cherry Creek

Long Lake

Fish do not reproduce in Long Lake or its inlet streams, but rainbow trout have been stocked nearly every year since 1950. Seepage and water release through a gate valve at the dam augments discharge during the summer and early fall. Under this alternative, the reservoir surface elevation would remain the same, thus there would be no change in the carrying capacity to lake rearing fish. The release of stored water would continue to augment downstream flow. With managed flow regulation, potentially more of the impounded water could be released to downstream fisheries. The net effect would be to maintain existing conditions for fish in the lake and possibly improve conditions to downstream fish.

Lower Buck Lake

Lower Buck has been stocked with rainbow trout on most years since 1950. Fish do not reproduce naturally in the lake or the inlet or outlet streams. Leakage gradually releases water from the 270 acre-feet of impoundment. CDFG considers the maintenance of flow from Lower Buck Lake important to sustain natural reproduction of rainbow trout in Wood Lake. Under this alternative, the effect of dam reconstruction and flow regulation on fish would be similar to the current leakage. Fisheries in the lake and outlet stream would be maintained at the current level.

Lily Creek

Y-Meadow

Y-Meadow reservoir was stocked with Arctic grayling in 1972 and with rainbow trout from 1989 through 1993. Since then, CDFG has suspended fish stocking at Y-Meadow to protect mountain yellow-legged frogs and to maintain the genetic structure of trout in the Clavey River watershed, which includes the headwaters of Lily Creek and the Y-Meadow drainage. No fish have been reported in lake surveys or angler reports since July of 1994. There is no record of fish successfully reproducing in the lake or inlet stream. There is also a population of large fairy shrimp in the reservoir, which are attractive prey to trout and normally selectively foraged before other food items. Therefore, it is unlikely that fish still reside in Y-Meadow reservoir.

Water seepage and release from Y-Meadow dam helps to support stream dwelling trout between the dam and Bear Lake. Brook trout were stocked into Granite Lake, a tributary to Lily Creek downstream from Y-Meadow dam. Despite the stocking history in Y-Meadow and Granite, unconfirmed reports of brook trout in Lily Creek and a self-sustaining population of brook trout in Bear Lake, the Clavey River basin is considered by CDFG to possess fish largely native to this portion of the Sierra Nevada.

Repair and operation of the water valve would enable more of the stored water to be released during dry periods. A direct effect of increased discharge would likely be increased availability of zooplankton in the aquatic drift as potential prey organisms for fish.

Maintenance and operation of Y-meadow dam could result in indirect effects associated with increased release of water during the summer and fall. The increased discharge could

reduce maximum summer water temperatures and increase the dissolved oxygen content of water. The wetted area available to fish for rearing would increase. The net effect of the changes from the current status would be sustained or increased fish survival and growth.

If the impoundment were completely drained for repairs, there would be a short-term reduction in fairy shrimp. Fairy shrimp are adapted to life in ephemeral ponds. Young hatched from eggs in the mud should rapidly repopulate the impoundment.

Bear Lake

Rainbow trout were stocked into Bear Lake nearly every year from 1952 through 1998, but are no longer stocked. Brook trout were stocked into the headwaters of the Lily Creek watershed in Granite Lake and anglers have reported catching brook trout on survey cards although there is no record of brook trout stocking into Bear Lake. Both brook and rainbow trout are now self-sustaining.

Under this alternative, the Bear Lake impoundment would not be maintained. The dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. This would result in the loss of 6 acres of lake rearing habitat (24%) and 10 feet of depth (20%). Some stream habitat may be added as the lake recedes into its basin.

South Fork Stanislaus

Cooper Meadow Lake

Population studies were not available documenting fish populations in this lake. An angler reported capture of brown trout from Cooper Meadow Creek on a 1998 survey card. CDFG considers this impoundment important to maintain brook trout.

The Cooper Meadow Lake dam has stabilized recently at an elevation of 6 feet above the old stream thalweg after losing the top 2½ feet of the dam before 1972. Under this alternative, the dam would gradually deteriorate and the streambed would return to its former grade. The maximum depth of pools in the meadow would decrease. The impounded area would decrease and wetted habitat would gradually shift to a low gradient stream. The fish population is of unknown size and composition, but trout are likely to persist through the change in habitat from pond to low gradient stream. The direct effect on fish habitat would be a loss of pool area, volume, and depth, and a small gain in riffle habitat. There would be less rearing area, but potentially increased spawning area and production of riffle dwelling aquatic invertebrates. Stream temperature may slightly decline due to reduced water residence time in the open meadow.

Whitesides Meadow

No fisheries resources are known to occur at this site; therefore, the lack of maintenance would have no direct or indirect effects on downstream fishery values.

3.8.7.1.2. Cumulative Effects

The cumulative effects associated with this alternative include greater capacity for the storage and release of water in the East, North, and West Fork Cherry Creek sub-watersheds. The increased discharge from released water during summer and early fall would maintain or increase the wetted stream habitat and increase the summer carrying

capacity of fish in those streams. The effects would be most pronounced to overall stream discharge in headwater areas upstream from the confluence of major tributaries. Increased discharge would increase depth, moderate the effect of high air temperatures on water temperatures, maintain or increase oxygen concentrations, and reduce isolation of habitat during periods of ephemeral flow (improved connectivity). Increased flow may result in increased spawning success and egg to fry survival.

East Fork Cherry Creek (Snow, Bigelow, Horse Meadow, Huckleberry): Snow Lake, Bigelow Lake, and Huckleberry Lake would each have their impoundments maintained and flow regulated. There is potential for increased flow relative to the existing condition, however; the changes to fisheries should be relatively minor since the impoundments are largely intact and water is already being released. Flow management at Snow Lake may partially compensate for loss of storage and habitat at Horse Meadow. Gradual deterioration of the Horse Meadow dam could result in short-term effects from increased sediment transport and increased turbidity from suspended solids to Huckleberry Lake and its inlet stream.

North Fork Cherry Creek (High Emigrant, Emigrant Meadow, Middle Emigrant, Emigrant, and Cow Meadow): Each of the dams in the North Fork Cherry Creek watershed would be restored, maintained, and regulated to provide increased flows to maintain fisheries. Increased storage and release potential at High Emigrant, Emigrant Meadow, and Middle Emigrant would help maintain or improve in-stream conditions for spawning and rearing trout, although portions of the stream may still flow intermittently during dry years. Flow from Emigrant Lake would be substantial in the maintenance of aquatic resources in the 6.8 miles of stream down to the confluence with Cherry Creek and including Cow Meadow.

Middle Fork Cherry Creek (Red Can, Leighton, and Yellowhammer): Cumulative effects to fisheries in this watershed would be minor relative to the existing condition. Red Can and Yellowhammer would not be maintained, but they have little impact on flow. There may be increased connectivity of stream habitat should their dams further deteriorate. Leighton Lake dam would be restored and regulated, enabling flows to be sustained during dry years and increasing the depth of the lake for over-wintering fish. The impoundment has a relatively small volume.

West Fork Cherry Creek (Long and Lower Buck): Flow out of Long Lake and Lower Buck Lake is important to fisheries in the lakes immediately downstream (Deer Lake and Wood Lake respectively). The natural flow regimes plus a combined 650 acre-feet of impounded volume contributes a significant percentage of flow where they combine in Buck Meadow Creek. There is potential to use more available storage in both the Deer Lake and Buck Lake drainages, but there would likely be no noticeable effect to fisheries.

Lily Creek (Y-Meadow and Bear): During dry years, the Y-meadow impoundment may contribute all the flow to the headwaters of Lily Creek above the confluence with the Granite Lake tributary. The influence of Y-Meadow on flows to Bear Lake and its rainbow and brook trout, and the combined storage potential of Y-Meadow and Bear Lake, are important to maintaining trout spawning in upper Lily Creek during dry years. Only a portion of the impounded volume is currently being used, so there is potential to increase stream carrying capacity, spawning success, and egg to fry survival.

Table 3-29 Effects of Alternative 1 on Fisheries Resources

Dam		Fish Species and Source	Maximum Lake Surface ¹ (acres)	Maximum Lake Depth ² (feet)	Carrying Capacity Based on Habitat	
Status	Site				Lake Fish	Stream Fish
Maintained	Snow	Self-sustaining RT, BK	No Change	No Change	Maintained	Maintained
	Bigelow	Stocked RT Self-sustaining BK	No Change	No Change	Maintained	Maintained
	Huckleberry	Self-sustaining RT, BK	No Change	No Change	Maintained	Maintained
	High Emigrant	Stocked RT Self-sustaining BK	No Change	No Change	Maintained	Maintained
	Emigrant Meadow	Self-sustaining RT, BK	No Change	No change	Maintained	Maintained
	Middle Emigrant	Self-sustaining RT, BK	Slight Increase	↑3	Maintained	Maintained
	Emigrant	Self-sustaining RT, BK	No Change	No Change	Maintained	Increased
	Cow Meadow	Self-sustaining RT, BK	↑18	↑3	Increased	Unknown ³
	Leighton	Stocked RT	No Change	No Change	Increased	Maintained
	Long	Stocked RT	No Change	No Change	Maintained	Maintained
	Lower Buck	Stocked RT	No Change	No Change	Maintained	Maintained
	Y-Meadow	None in Reservoir RT in Stream	No Change	No Change	No Fish	Maintained
Not Maintained	Horse Meadow	Self-sustaining BK	Decrease	↓3	Decrease	Short-term ↓
	Red Can	Stocked RT	↓1	↓3	Decrease	Increase
	Yellowhammer	Stocked RT	↓2	↓3	Small ↓	Small ↑
	Bear	Self-sustaining RT, BK	↓6	↓8	Decrease	Decrease
	Cooper Meadow	Unknown	Decrease	↓8	Unknown	Unknown
	Whitesides Meadow	No Fish	Decrease	↓10	No Fish	Unknown

Flow regulation may generate small increases in stream habitat and small decreases in lake habitat. Huckleberry Lake may shrink slightly in surface size due to transport of sediment stored behind Horse Meadow dam.

¹ Relative to the current situation.

² Relative to the current situation.

³ Because the "new" dam would isolate stream populations from lake populations, there would be a decrease in connectivity.

South Fork Stanislaus (Cooper and Whitesides Meadow): There would be little or no cumulative effects from this alternative to fisheries in the South Fork of the Stanislaus River watershed.

3.8.7.1.3. Other Potential Effects

Loss of carrying capacity or spawning success due to changes in discharge may prompt CDFG to increase stocking to maintain fishing opportunities. In general, it is expected that this alternative would maintain or improve existing fisheries and obviate the need for a change in stocking practices.

Y-Meadow Lake has no fisheries resource, but it would lose rearing area for fairy shrimp.

Release of impounded water may draw down some impoundments more than occurs under existing conditions. This would be particularly true of Long Lake, Lower Buck, High Emigrant, Snow Lake, and Bigelow that would not be recharged from upstream releases. Those lakes could see a decline in available fish rearing habitat during dry periods

3.8.7.2. ALTERNATIVE 2 – NO ACTION

3.8.7.2.1. Direct and Indirect Effects

East Fork Cherry Creek

Snow Lake

Snow Lake has self-sustaining populations of both brook and rainbow trout. The dams are intact, however; the control valve does not function. The gradual release of water from leakage contributes to downstream flows. Under this alternative, the dam would eventually deteriorate and revert to the natural lake surface elevation. The water depth would drop ten feet (22%), and the surface area would decrease by eight acres (20%). Lake outlet discharge would revert to the natural streamflow regime with no storage and release capability. Depending on precipitation and runoff, outlet flows may become intermittent. The effect to fish would be greatest near the lake and immediately downstream. The direct effect on flow and aquatic resources would be less pronounced as other tributaries joining the East Fork Cherry Creek drainage. The population of brook and rainbow trout in the lake would likely to persist, but in lower numbers due to reduced rearing capacity. Stream rearing trout near the lake may survive dry periods by moving into the lake assuming fish can move through the rock rubble. Stream rearing trout without access to the lake may not persist through dry periods.

Bigelow Lake

Bigelow Lake has rainbow trout stocked annually and a self-sustaining brook trout population. The dams are intact, however; the control valve does not function. The gradual release of water from leakage contributes to downstream flows. Over time, the dams would deteriorate and the lake would return to the natural lake level and acreage. Lake depth could drop nine feet (16%) and surface area decline by ten acres (20%). The carrying capacity of the lake would be reduced. Brook trout are likely to persist, but in reduced numbers.

Without storage and release of water, the lake outlet flow may become intermittent. Fish survival is likely to decline between Bigelow Lake and the confluence of Horse Meadow stream.

Horse Meadow

Horse meadow has a self-sustaining population of brook trout. The dam has trapped streambed material and the impoundment has filled with sediment. Under this alternative, the dam would continue to deteriorate. Newly aggraded sediment would scour and the grade gradually cut down to the historic channel. As the channel degraded, there would likely be a loss of rearing habitat and reduced carrying capacity of fish until the channel stabilized. There may be a reduction in the number of aquatic invertebrates during times of greatest channel change. The redistribution of sediment could cause a temporary reduction of pool habitat and increase the deposit of sediments in low gradient riffles upstream from Huckleberry Lake. Over time, the accumulated sediments would be deposited into Huckleberry Lake. The duration and intensity of effects to aquatic resources is largely dependent on the magnitude of changes in the dam. Small changes would result in less release of sediment and minor (perhaps immeasurable) changes in habitat. A sudden collapse of the dam would likely result in a noticeable slug of suspended sediment and bed material moving downstream, and changes in pool frequency and depth.

Huckleberry Lake

Brook trout and rainbow trout are self-sustaining in the Huckleberry Lake and its inlet and outlet streams. The gradual deterioration of the dams would likely reduce survival rate and carrying capacity of fish in the East Fork of Cherry Creek. Under this alternative, lake depth would eventually decrease by four feet (8%) and the surface area decrease by 25 acres (19%).

Water temperature on East Fork of Cherry Creek between Horse Meadow and Huckleberry Lake may respond in part to the volume of release from Snow Lake and Bigelow Lake dams (Kelly et al., 1999). Lower releases may result in higher water temperatures. Higher stream temperatures would tend to boost productivity in Huckleberry Lake, however; overall productivity would likely decline due to reduced surface area and loss of nutrients from seasonally flooded riparian habitat.

North Fork Cherry Creek

High Emigrant Lake

The deterioration of the High Emigrant dam would eventually lower lake depth by eight feet (36%) and surface area by four acres (40%). The reduced size and volume would lower the carrying capacity of the lake for trout. Without the storage and release of impounded water, the outlet stream would flow seasonally. Brook trout residing in the outlet stream would need to move through the rubble remains of the dam into the lake to survive dry periods. Several years of drought in succession that prevented spawning could result in the loss of trout populations of High Emigrant and Emigrant Meadow Lakes.

Emigrant Meadow Lake

Emigrant Meadow Lake's self-sustaining brook and rainbow trout populations are considered by CDFG to be partially dependent on water releases from High Emigrant dam

for successful spawning. In combination with a functional dam and water management at High Emigrant reservoir, the Emigrant Meadow reservoir provides sufficient storage to insure natural reproduction at Middle Emigrant and Emigrant Lake spawning areas. The cumulative storage and release of water from the four Emigrant dams at least partially drives the ability of trout to reproduce in this watershed.

Under this alternative, the dam would not be maintained. The lake surface elevation would eventually drop six feet (15%) and the surface area would shrink by 13 acres (29%). The lake carrying capacity could decline by a commensurate amount.

Middle Emigrant Lake

Middle Emigrant Lake has a self-sustaining run of both rainbow trout and brook trout. The loss of the remaining three feet of the dam would reduce the depth of the lake by 3 feet back to the natural lake level and reduce the surface area approximately four acres (22%). This natural lake was relatively shallow, with a maximum depth of 21 feet. CDFG is concerned for over-winter survival. The combination of reduced inflow from High Emigrant and Emigrant Meadow Lake and the reduction of water depth could contribute to low oxygen saturation and kill or stress fish. As with the two upstream reservoirs, there may be insufficient water for successful spawning during dry years. Several successive years of drought and loss of fish year classes could jeopardize the trout population.

Emigrant Lake

Emigrant Lake has a self-sustaining run of both rainbow trout and brook trout. The deterioration and eventual loss of the dam could affect stream fish between Emigrant and the confluence with the East Fork of Cherry Creek. The effects to fish along these 6.8 miles of stream would be decreased stream surface area, decreased depth, possibly warmer stream temperatures and decreased oxygen concentrations, and an increase in habitat isolated during periods of ephemeral flow (i.e., lost connectivity). Decreased flow into and out of Emigrant Lake would likely result in decreased spawning success and lower egg to fry survival.

Loss of the dam would result in a decrease in lake depth of nine feet (26%) and a loss of 50 acres (26%) of surface area. The carrying capacity of fish in the lake is likely to diminish proportionately to the lost habitat.

Cow Meadow

This dam was destroyed by storm events and the existing condition is the natural lake level. Rainbow trout and brook trout would continue to reproduce naturally in the stream.

Middle Fork Cherry Creek

Red Can Lake

Red Can Lake is stocked annually with rainbow trout. Should the dam fail due to lack of maintenance, one acre of pond habitat would revert to stream habitat. Effects to fish would be minimal.

Leighton Lake

Leighton Lake is stocked with rainbow trout annually. The dam is present, but the porosity of the dam prevents complete impoundment of water. During dry periods, the lake surface drops below the outlet. The partially functioning dam may reduce the risk of winterkill or high summer water temperatures (and low oxygen saturation) by slowing the release of water. The complete loss of the dam would lower the maximum lake elevation by six feet (23%) and decrease the maximum surface area by four acres (16%); however, these maximum values may only be reached briefly. Reduced lake depth could result in winterkill and the loss of older year classes of fish.

Yellowhammer Lake

Rainbow trout are stocked into Yellowhammer Lake annually. The dam is present, but the porosity of the dam prevents complete impoundment of water. The dam slows release of water during wet periods and temporarily enlarges the lake size from 18 acres to 20 acres. As the dam further deteriorates, the effect of seasonal flooding would tend to diminish. Seasonal flooding expands the rearing habitat and may provide a short-term nutrient boost to fish and aquatic organisms. The deterioration of the dam may enable fish and other aquatic organisms to move between the outlet stream and lake.

West Fork Cherry Creek*Long Lake*

Fish do not reproduce in Long Lake or its inlet streams, but rainbow trout have been stocked nearly every year since 1950. Seepage and water release through a gate valve at the dam augments discharge during the summer and early fall. Under this alternative, the dam would gradually deteriorate and revert to the original lake basin. The reservoir depth would decrease by eight feet (23%) and the surface would decrease by 13 acres (19%). The carrying capacity would drop commensurate with the decrease in area. During dry periods, the outlet stream would likely go dry. Fish residing in the stream between Deer Lake and Long Lake may need to move to Deer Lake to survive dry periods.

Lower Buck Lake

Lower Buck has been stocked with rainbow trout on most years since 1950. Fish do not reproduce naturally in the lake or the inlet or outlet streams, so stocking is necessary to maintain the fish population. Leakage gradually releases water from the 270 acre-feet of impoundment. CDFG considers the maintenance of flow from Lower Buck Lake important to sustain natural reproduction of rainbow trout in Wood Lake. Under this alternative, the dam would continue to deteriorate until it could no longer retain water. Flow to Wood Lake would be dependent upon natural runoff. In dry years, discharge to Wood Lake may be inadequate for successful spawning and a year class of fish could be lost. If there were several dry years in succession and fish were not able to reproduce, the Wood Lake fishery would be lost without supplemental stocking. Wood Lake has not been stocked since 1955.

Lily Creek

Y-Meadow

Y-Meadow dam contains rock too large to be mobilized by the stream and would likely persist in some form indefinitely even without maintenance. As the top of the dam deteriorates, less water would be stored and released through seepage. The volume of water stored would gradually decline as sediment accumulates behind the dam or its remnant. During dry years, downstream fish would be confined to deep pools for survival. If there were several successive years of drought and fish were not able to spawn, trout could be lost to the upper Lily Creek.

Decreased discharge could increase maximum summer water temperatures and decrease the dissolved oxygen content of water. The area flooded and available to fish for rearing would decrease. The net effect of the changes from the current status would be decreased fish survival and growth.

The dam has trapped an unknown quantity of granite sands and other sediment. A sudden breach or gradual lowering of the dam to the elevation of stored sediment could result in mobilization of that substrate as suspended sediment or bed load. The stream channel would get wider and shallower as the bed material moved downstream. Pools would fill with substrate and riffles would become covered with fine-grained substrate. Over time, the material would move downstream and deposit into Bear Lake. In addition to the temporary loss of rearing and spawning habitat in Lily Creek, the interstitial spaces of substrate would be filled and cover habitat for aquatic invertebrates. Bear Lake would lose some volume and species requiring clean gravel and constant flow may temporarily decline until the stream transports the accumulated material.

Bear Lake

Under this alternative, the Bear Lake impoundment would not be maintained. The dam is expected to deteriorate over the next twenty years until the surface is at the historic lake level. This would result in the loss of six acres of lake rearing habitat. Some stream habitat may be added as the lake recedes into its basin and as sediment stored in Y-Meadow is deposited onto Bear Lake's inlet delta.

South Fork Stanislaus

Cooper Lake

The Cooper Lake dam has stabilized recently at an elevation of six feet above the old stream thalweg. Under this alternative, the dam would gradually deteriorate and the streambed would return to its former grade. The maximum depth of pools in the meadow would decrease. The impounded area would decrease and the channel would develop into a low gradient stream. The fish population is of unknown size and composition, but trout are likely to persist through the change in habitat from pond to low gradient stream. The direct effect on fish habitat would be a loss of pool area, volume, and depth, and a small gain in riffle habitat. There would be less rearing area, but potentially increased spawning area and increased production of riffle dwelling aquatic invertebrates. Stream temperature may slightly decline due to reduced water residence time in the open meadow. As the dam deteriorates, there may be increased connectivity between the stream and meadow, with reduced restriction on movement of aquatic organisms.

Whitesides Meadow

No fisheries resources are known to occur at this site; therefore, the lack of maintenance would have no direct or indirect effects on downstream fishery values.

3.8.7.2.2. Cumulative Effects

The extremes in flow would likely reduce the carrying capacity of fish on each sub-watershed, with the magnitude dependent on natural runoff. The effects relative to the existing condition would be most prominent where storage and release are large relative to natural streamflow (e.g. Y-Meadow).

East Fork Cherry Creek (Snow, Bigelow, Horse Meadow, Huckleberry): A reduction in water volume stored and released from Snow and Bigelow lakes during dry periods could result in loss of fish and a wider range of stream water temperatures in the stream segments downstream from the dams. During summer, the reduced water volume would heat more readily during the day resulting in higher daily maximum temperatures. During fall, the reverse could occur and streams with lower discharge may cool or freeze more readily. Gradual loss of Horse Meadow's wetland as the water table drops may result in reduced ground water and further reduction in flow downstream. Continued deterioration of Horse Meadow dam could release stored sediments that would eventually deposit into Huckleberry Lake. The gradual deterioration of the dams would likely reduce survival rate and carrying capacity of fish in the East Fork of Cherry Creek.

North Fork Cherry Creek (High Emigrant, Emigrant Meadow, Middle Emigrant, Emigrant, and Cow Meadow): Loss of stored and released water from High Emigrant, in concert with streamflow maintenance dams at Emigrant Meadow, Middle Emigrant, and Emigrant lakes, cumulatively impacts fisheries within the North Fork Cherry Creek watershed. The storage and release of water from the four Emigrant dams at least partially drives the ability of trout to reproduce in this watershed. There would be a cumulative loss of about 1,500 acre-feet of storage potential (relative to existing condition), and a decline in fish habitat and carrying capacity to the confluence of the North and East Forks of Cherry Creek.

Middle Fork Cherry Creek (Red Can, Leighton, and Yellowhammer): Cumulative effects to fisheries in this watershed would be minor relative to the existing condition since these dams have little storage capacity. There may be increased connectivity of stream habitat should the dams further deteriorate.

West Fork Cherry Creek (Long and Lower Buck): Flow out of Long Lake and Lower Buck Lake is important to fisheries in the lakes immediately downstream (Deer Lake and Wood Lake respectively). The fisheries in both the Deer Lake and Buck Lake drainages would likely persist in the absence of these dams, but spawning may be unsuccessful during dry years. The loss of a combined 650 acre-feet of impounded volume in Buck Meadow Creek may reduce carrying capacity, but population changes would likely not be discernible over natural fluctuations.

Lily Creek (Y-Meadow and Bear): During dry years, the Y-Meadow impoundment may contribute all the flow to the headwaters of Lily Creek above the confluence with the Granite Lake tributary. The influence of Y-Meadow on flows to Bear Lake and its rainbow and brook trout, and the combined storage potential of Y-Meadow and Bear Lake are important to maintaining trout spawning in upper Lily Creek during dry years. Only a portion of the

impounded volume is currently being used. The change from the existing condition would primarily be the loss of fish immediately below Y-Meadow dam and reduced spawning or egg to fry survival during dry years.

South Fork Stanislaus (Cooper and Whitesides Meadow): There would be little or no cumulative effects from this alternative to fisheries in the South Fork of the Stanislaus River watershed.

3.8.7.2.3. Other Potential Effects

The anticipated loss of carrying capacity from reduced lake size may affect fish size and condition. Large, piscivorous fish often benefit from seasonal concentration of prey such as occurs during reservoir draw down. Warmer stream and lake temperatures from reduced stream and lake volumes may stimulate primary and secondary production and increase summer growth rate of fish. Conversely, temperatures that approach lethal limits could further reduce fish growth, reproduction, and survival particularly in concert with lower oxygen saturation. The magnitude and direction of these effects is a function of flow and temperature regimes.

Dams constructed on relatively low gradient sites may persist as unconsolidated rubble after the dam ceases to impound water. One short-term consequence could be continued blockage of upstream migration through the rubble. Fish may not be able to move upstream into the lake as stream waters recede.

A possible consequence to loss of a self-sustaining population of trout is pressure to increase fish stocking to maintain population levels. Y-Meadow Lake has no fisheries resource, but it would lose rearing area for fairy shrimp.

Gradual deterioration of the Horse Meadow dam could result in short-term effects. Effects would include increased sediment transport and increased turbidity from suspended solids to Huckleberry Lake and its inlet stream. Localized loss of fish from stream segments or impoundments associated with this alternative may improve survival of amphibians. The mountain yellow-legged frog in particular has a long aquatic larval stage making it very susceptible to predation by trout.

Table 3-30 Effects of Alternative 2 on Fisheries Resources

Dam		Fish Species and Source	Maximum Lake Surface ¹ (acres)	Maximum Lake Depth ² (feet)	Carrying Capacity Based on Habitat	
Status	Site				Lake Fish	Stream Fish
Not Maintained	Snow	Self-sustaining RT, BK	↓ 8	↓10	Decrease	Decrease
	Bigelow	Stocked RT Self-sustaining BK	↓10	↓9	Decrease	Decrease
	Horse Meadow	Self-sustaining BK	Decrease	↓3	Decrease	Short-term ↓
	Huckleberry	Self-sustaining RT, BK	↓25	↓4	Decrease	Decrease
	High Emigrant	Stocked RT Self-sustaining BK	↓4	↓8	Decrease	Decrease
	Emigrant Meadow	Self-sustaining RT, BK	↓13	↓6	Decrease	Decrease
	Middle Emigrant	Self-sustaining RT, BK	↓4	↓3	Decrease	Decrease
	Emigrant	Self-sustaining RT, BK	↓50	↓9	Decrease	Decrease
	Cow Meadow	Self-sustaining RT, BK	No Change	No Change	No Change	No Change
	Red Can	Stocked RT	↓1	↓3	Decrease	Increase
	Leighton	Stocked RT	↓4	↓6	Decrease	Decrease
	Yellowhammer	Stocked RT	↓2	↓3	Small ↓	Small ↑
	Long	Stocked RT	↓13	↓8	Decrease	Decrease
	Lower Buck	Stocked RT	↓8	↓12	Decrease	Decrease
	Y-Meadow	None in Reservoir RT in Stream	↓20	↓25	No Fish	Decrease
	Bear	Self-sustaining RT, BK	↓ 6	↓8	Decrease	Decrease
	Cooper Meadow	Unknown	Decrease	↓8	Unknown	Unknown
	Whitesides Meadow	No Fish	Decrease	↓10	No Fish	Unknown

Huckleberry Lake may shrink slightly in surface size due to transport of sediment stored behind Horse Meadow dam.

3.8.7.3. ALTERNATIVE 3 – HERITAGE

3.2.7.3.1. Direct and Indirect Effects

East Fork Cherry Creek

Snow Lake

Snow Lake has self-sustaining populations of both brook and rainbow trout. The dams are intact, however; the control valve does not function. The gradual release of water from leakage contributes to downstream flows. Under this alternative, the dam would eventually

¹ Relative to the current situation.

² Relative to the current situation.

deteriorate and revert to the natural lake surface elevation. The water depth would drop ten feet (22%) and the surface area would decrease by eight acres (20%). Discharge at the lake outlet would revert to the natural streamflow regime with no storage and release capability. Depending on precipitation and runoff, the outlet stream may become intermittent. The effect to fish would be greatest near the lake and immediately downstream. The direct effect on flow and aquatic resources would be less pronounced downstream as other tributaries join the East Fork Cherry Creek drainage. The population of brook and rainbow trout in the lake are likely to persist, but in lower numbers due to reduced rearing capacity. Stream rearing trout near the lake may survive dry periods by moving into the lake assuming fish can move through the rock rubble. Stream rearing trout without access to the lake may not persist through dry periods.

Bigelow Lake

Bigelow Lake dam would be restored and maintained under this alternative. Bigelow has populations of brook and rainbow trout. In 1999, anglers also reported harvesting brown trout, but their presence has not been confirmed by CDFG surveys. Rainbow trout have been stocked annually. Brook trout were last stocked in 1972 and they are now self-sustaining.

The dams are intact; however, the control valve does not function. The gradual release of water from leakage contributes to downstream flows. Dam repair and flow management would enable additional water to be released during summer low flows to increase survival and carrying capacity of fish in the East Fork of Cherry Creek. Depending on precipitation and runoff, managed flow release could draw the lake down further in the summer than present leakage, with consequent loss of lake rearing habitat. Stream habitat would increase slightly with greater wetted surface and depth from increased flow. CDFG biologists believe that water temperature on East Fork of Cherry Creek between Horse Meadow and Huckleberry Lake may respond in part to the volume of release from Snow Lake and Bigelow dams (Kelly et al., 1999). Lower flows may result in higher water temperatures.

Horse Meadow

Horse Meadow has a self-sustaining population of brook trout. The dam has trapped streambed material and the impoundment has filled with sediment. Under this alternative, the dam would continue to deteriorate. Newly aggraded sediment would scour and the grade gradually cut down to the historic channel. As the channel degraded, there would likely be a loss of rearing habitat and reduced carrying capacity of fish until the channel stabilized. There may be a reduction in the number of aquatic invertebrates during times of greatest channel change. The redistribution of sediment could cause a temporary reduction of pool habitat and increase the deposit of sediments in low gradient riffles upstream from Huckleberry Lake. Over time, the accumulated sediments would be deposited into Huckleberry Lake. The duration and intensity of effects to aquatic resources is largely dependent on the magnitude of changes in the dam. Small changes would result in less release of sediment and minor (perhaps immeasurable) changes in habitat. A sudden collapse of the dam would likely result in a noticeable slug of suspended sediment and bed material moving downstream and changes in pool frequency and depth.

Huckleberry Lake

Brook trout and rainbow trout are self-sustaining in Huckleberry Lake and its inlet and outlet streams. The gradual deterioration of the dams would likely reduce survival and carrying capacity of fish in the East Fork of Cherry Creek. Under this alternative, lake depth would eventually decrease by four feet (8%) and the surface area would decrease by 25 acres (19%), reducing the carrying capacity of fish in the lake.

Water temperature on East Fork of Cherry Creek between Horse Meadow and Huckleberry Lake may respond in part to the volume of release from Snow Lake and Bigelow dams (Kelly et al., 1999). Lower releases may result in higher water temperatures. Higher stream temperatures would tend to boost productivity in Huckleberry Lake; however, overall productivity would likely decline due to reduced surface area and loss of nutrients from seasonally flooded riparian habitat.

North Fork Cherry Creek

High Emigrant Lake

The deterioration of the High Emigrant dam would eventually lower lake depth by eight feet (36%), increasing the chance of winterkill and decreasing the surface area by four acres (40%). The reduced size and volume would lower the carrying capacity of the lake for trout. Without the storage and release of impounded water, the outlet stream would flow seasonally. Brook trout residing in the outlet stream would need to move through the rubble remains of the dam into the lake to survive dry periods. Several years of drought in succession that prevented spawning could result in the loss of trout populations of High Emigrant and Emigrant Meadow Lakes.

Emigrant Meadow Lake

Emigrant Meadow Lake was stocked with rainbow trout in 1988 and 1989. It has been self-sustaining since. Brook trout are also present and self-sustaining. The reservoir provides sufficient storage to insure natural reproduction at Emigrant Lake spawning areas. The cumulative storage and release of water from the four Emigrant dams was considered sufficient to provide "a minimum flow of 80 miners inches or more, the full distance to the junction of Cherry and Elinor Creeks." (Cherry Creek Development – Historical).

Water release through a gate valve at the dam augments discharge during the summer and early fall. Under this alternative, the dam and gate would be maintained in their present good condition. The reservoir surface elevation would remain the same, thus there would be no change in the carrying capacity to lake rearing fish. The release of stored water would continue to augment downstream flow. With managed flow regulation, potentially more of the impounded water could be released to downstream fisheries. The net effect would be to maintain existing conditions for fish in the lake, and possibly improve conditions to downstream spawning and rearing fish.

Middle Emigrant Lake

Middle Emigrant Lake has a self-sustaining run of both rainbow trout and brook trout. The loss of the remaining three feet height of the dam would reduce the depth of the lake by three feet back to the natural lake level and reduce the surface area by approximately four acres (22%). The natural lake was relatively shallow with a maximum depth of 21 feet.

CDFG is concerned for over-winter survival. The combination of reduced inflow from High Emigrant and Emigrant Meadow Lake and reduction of water depth could contribute to low oxygen saturation levels and kill or stress fish. As with the two upstream reservoirs, there is concern that there could be insufficient water for successful spawning on dry years. Several successive years of drought and loss of fish year classes could jeopardize the trout population.

Emigrant Lake

Emigrant Lake has a self-sustaining run of both rainbow trout and brook trout. This alternative would include the repair of the flow control valve that would enable a more complete use of the Emigrant Lake reservoir water storage and release capability. Dam repair and flow management would enable increased discharge to augment summer flows and increase survival and carrying capacity of fish in the North Fork of Cherry Creek. The effect would be most significant above the confluence with the East Fork of Cherry Creek. The effects to fish along these 6.8 miles of stream would be increased stream surface area, increased depth, possibly cooler stream temperatures and increased oxygen concentrations, and a reduction in habitat isolated during periods of ephemeral flow (improved connectivity). Increased flow may result in increased spawning success and egg to fry survival.

Flow management and release of stored water would gradually draw down Emigrant Lake during the late summer and early fall. If all impounded water were released, the surface area of the lake would diminish in elevation by nine feet and 50 surface acres of lake rearing habitat would be to the level of the flow control valve, or the pre-dam lake level. The existing uncontrolled water release generally does not result in the release of all impounded water.

Cow Meadow

The dam was destroyed by storm events and the existing condition is the natural lake level. Rainbow trout and brook trout would continue to reproduce naturally in the stream.

Middle Fork Cherry Creek

Red Can Lake

Red Can Lake is stocked annually with rainbow trout. Should the dam fail due to lack of maintenance, one acre of pond habitat would revert to stream habitat. Effects to fish would be minimal.

Leighton Lake

Leighton Lake is stocked with rainbow trout annually. The dam is present, but the porosity of the dam prevents complete impoundment of water. During dry periods, the lake surface elevation drops below the outlet. The complete loss of the dam would lower the maximum lake elevation by six feet (23%) and decrease the maximum surface area by four acres (16%); however, these maximum values may only be reached briefly. Reduced lake depth in the existing situation could result in winterkill and the loss of older year classes of fish. Reconstruction would increase the maximum depth and enable release of some water to augment downstream flow.

Yellowhammer Lake

Rainbow trout are stocked into Yellowhammer Lake annually. The dam is present, but the porosity of the dam prevents complete impoundment of water. The dam slows release of water during wet periods and temporarily elevates the lake to the impoundment size of 20 acres. As the dam further deteriorates, the effect of seasonal flooding would tend to diminish. Seasonal flooding expands the rearing habitat by two acres and may provide a short-term nutrient boost to fish and aquatic organisms.

West Fork Cherry Creek

Long Lake

Fish do not reproduce in Long Lake or in its inlet streams, but rainbow trout have been stocked nearly every year since 1950. Seepage and water release through a gate valve at the dam augments discharge during the summer and early fall. Under this alternative, the reservoir surface elevation would remain the same, thus there would be no change in the carrying capacity to lake rearing fish. The release of stored water would continue to augment downstream flow. With managed flow regulation, potentially more of the impounded water could be released to downstream fisheries. The net effect would be to maintain existing conditions for fish in the lake and possibly improve conditions to downstream fish.

Lower Buck Lake

Lower Buck has been stocked with rainbow trout on most years since 1950. Fish do not reproduce naturally in the lake or the inlet or outlet streams, so stocking is necessary to maintain the fish population. Leakage gradually releases water from the 270 acre-feet of impoundment. CDFG considers the maintenance of flow from Lower Buck Lake important to sustain natural reproduction of rainbow trout in Wood Lake. Under this alternative, the effect of dam reconstruction and flow regulation on fish would be similar to the current leakage. Fisheries in the lake and outlet stream would be maintained at the current level.

Lily Creek

Y-Meadow

Under this alternative, Y-Meadow dam would likely persist in some form for many years even without maintenance. Eventually, as the top of the dam deteriorated, less water would be stored and released through seepage and fish would be confined to deep pools for survival. If there were several successive years of drought and fish were not able to spawn, trout could be lost to the upper Lily Creek.

Decreased discharge could increase maximum summer water temperatures and decrease the dissolved oxygen content of water. The area flooded and available to fish for rearing would decrease. The net effect of the changes from the current status would be decreased fish survival and growth.

The dam has trapped an unknown quantity of granite sands and other sediment. A sudden breach or gradual lowering of the dam to the elevation of stored sediment could result in mobilization of that substrate as suspended sediment or bed load. The stream channel would get wider and shallower as the material moved downstream. Pools would fill with

substrate and gravel riffles would become covered with fine-grained substrate. Over time, the material would move downstream and deposit into Bear Lake. In addition to the temporary loss of rearing and spawning habitat in Lily Creek, the interstitial spaces of substrate would be filled and cover habitat for aquatic invertebrates. Bear Lake would lose some volume and species requiring clean gravel and constant flow may temporarily decline until the stream transports the accumulated material

Bear Lake

Under this alternative, the Bear Lake impoundment would not be maintained. The dam would deteriorate over the next twenty years until the surface is at the historic lake level. This would result in the loss of six acres of lake rearing habitat. Some stream habitat may be added as the lake recedes into its basin and as sediment stored in Y-Meadow is deposited onto Bear Lake's inlet delta.

South Fork Stanislaus

Cooper Lake

The Cooper Lake dam has stabilized recently at an elevation of six feet above the old stream thalweg. Under this alternative, the dam would gradually deteriorate and the streambed would return to its former grade. The maximum depth of pools in the meadow would decrease. The impounded area would decrease and the channel would develop into a low gradient stream. The fish population is of unknown size and composition, but trout are likely to persist through the change in habitat from pond to low gradient stream. The direct effect on fish habitat would be a loss of pool area, volume, and depth, and a small gain in riffle habitat. There would be less rearing area, but potentially increased spawning area and increased production of riffle dwelling aquatic invertebrates. Stream temperature may slightly decline due to reduced water residence time in the open meadow. As the dam deteriorates, there may be increased connectivity between the stream and meadow with reduced restriction on movement of aquatic organisms.

Whitesides Meadow

No fisheries resources are known to occur at this site; therefore, the lack of maintenance would have no direct or indirect effects on downstream fishery values.

3.8.7.3.2. Cumulative Effects

East Fork Cherry Creek (Snow, Bigelow, Horse Meadow, and Huckleberry): A reduction in water volume from Snow Lake could result in a small change in downstream carrying capacity and water temperatures. The effects would be tempered by continued release of stored water from Bigelow Lake. Continued deterioration of Horse Meadow dam could release stored sediments that would eventually deposit into Huckleberry Lake. The gradual deterioration of Snow Lake and Huckleberry Lake dams would likely reduce survival rate and carrying capacity of fish in the East Fork of Cherry Creek.

North Fork Cherry Creek (High Emigrant, Emigrant Meadow, Middle Emigrant, Emigrant, and Cow Meadow): A reduction in water volume from High Emigrant and Middle Emigrant could result in a change in spawning success and downstream carrying capacity in the North Fork of Cherry Creek watershed. The effects would be tempered by continued release of stored water from Emigrant Meadow and Emigrant Lake. Flow from Emigrant

Lake would be substantial in the maintenance of aquatic resources in the 6.8 miles of stream down to the confluence with Cherry Creek, including Cow Meadow.

Middle Fork Cherry Creek (Red Can, Leighton, and Yellowhammer): Red Can and Leighton would be restored and Leighton regulated, increasing flows during dry years and increasing the depth of the lake for over-wintering fish. Cumulative effects to fisheries in this watershed would improve relative to the existing condition, but flow from Leighton may still periodically be intermittent despite the restoration of the impoundment.

West Fork Cherry Creek (Long and Lower Buck): Flow out of Long Lake and Lower Buck Lake is important to fisheries in the lakes immediately downstream (Deer Lake and Wood Lake respectively). The natural flow regimes, plus a combined 650 acre-feet of impounded volume contributes a significant percentage of flow where they combine in Buck Meadow Creek. There is potential to use more available storage in both the Deer Lake and Buck Lake drainages, but there would likely be no noticeable effect to fisheries.

Lily Creek (Y-Meadow and Bear): During dry years, the Y-meadow impoundment may contribute all the flow to the headwaters of Lily Creek above the confluence with the Granite Lake tributary. The influence of Y-Meadow on flows to Bear Lake and its rainbow and brook trout, and the combined storage potential of Y-Meadow and Bear Lake are important to maintaining trout spawning in upper Lily Creek during dry years. Only a portion of the impounded volume is currently being used. The change from the existing condition would primarily be the loss of fish immediately below Y-Meadow dam and reduced spawning or egg to fry survival during dry years.

South Fork Stanislaus (Cooper and Whitesides Meadow): Under this alternative, there would be no discernible cumulative effects to fisheries in the South Fork of the Stanislaus River watershed.

3.8.7.3.3. Other Potential Effects

The anticipated loss of carrying capacity from reduced lake size may have unanticipated effects on fish size and condition. Large, piscivorous fish may benefit from seasonal concentration of prey. Warmer stream and lake temperatures from reduced stream and lake volumes may stimulate primary and secondary production and increase summer growth rate of fish. Conversely, temperatures that approach lethal limits could further reduce fish growth, reproduction, and survival, particularly in concert with lower oxygen saturation. The magnitude and direction of these effects is a function of flow and temperature regimes.

Dams constructed on relatively low gradient sites may persist as unconsolidated rubble after the dam ceases to impound water. One short-term consequence could be continued blockage of upstream migration through the rubble. Fish may not be able to move upstream into the lake as stream waters recede.

A possible consequence to loss of a self-sustaining population of trout is pressure to increase fish stocking to maintain population levels.

Y-Meadow Lake has no fisheries resource, but would lose rearing area for fairy shrimp.

Table 3-31 Effect of Alternative 3 on Fisheries Resources.

Dam		Fish Species and Source	Maximum Lake Surface ¹ (acres)	Maximum Lake Depth ² (feet)	Carrying Capacity Based on Habitat	
Status	Site				Lake Fish	Stream Fish
Maintained	Bigelow	Stocked RT Self-sustaining BK	No Change	No Change	Maintained	Maintained
	Emigrant Meadow	Self-sustaining RT, BK	No Change	No Change	Maintained	Maintained
	Emigrant	Self-sustaining RT, BK	No Change	No Change	Maintained	Increased
	Red Can	Stocked RT	No Change	No Change	Maintained	Maintained
	Leighton	Stocked RT	No Change	No Change	Increased	Maintained
	Long Lake	Stocked RT	No Change	No Change	Maintained	Maintained
	Lower Buck	Stocked RT	No Change	No Change	Maintained	Maintained
Not Maintained	Snow Lake	Self-sustaining RT, BK	↓8	↓10	Decrease	Decrease
	Horse Meadow	Self-sustaining BK	Decrease	↓3	Decrease	Short-term↓
	Huckleberry	Self-sustaining RT, BK	↓25	↓4	Decrease	Decrease
	High Emigrant	Stocked RT Self-sustaining BK	↓4	↓8	Decrease	Decrease
	Middle Emigrant	Self-sustaining RT, BK	↓4	↓3	Decrease	Decrease
	Cow Meadow	Self-sustaining RT, BK	No Change	No Change	No change	No change
	Yellowhammer	Stocked RT	↓2	↓3	Small↓	Small↑
	Y-Meadow	None in Reservoir RT in Stream	↓20	↓25	No Fish	Decrease
	Bear Lake	Self-sustaining RT, BK	↓6	↓8	Decrease	Decrease
	Cooper Meadow	Unknown	Decrease	↓8	Unknown	Unknown
	Whitesides Meadow	No Fish	Decrease	↓10	No Fish	Unknown

¹ Relative to the current situation.² Relative to the current situation.

3.9. BOTANY

The vegetation and soils of the Emigrant Wilderness have been described in the 1998 Emigrant Wilderness Management Plan EIS. Unusual habitats can have rare plants and plant communities. Open granite and lodgepole forests dominate the Emigrant Wilderness at the elevations of this project. However, red fir forest types have been mapped near Cooper Meadow and Bear Lake. Although primarily granitic, there are areas of volcanic soils near High Emigrant and Emigrant Meadow lakes. There are areas of metamorphic parent materials in the area of Bigelow and Snow lakes and Horse Meadow. Although only 10% of the wilderness, meadows are relatively more abundant in the areas near the dams and are the habitat for many of the sensitive plants that could occur there.

3.9.1. Sensitive Plant Review

No federally listed threatened or endangered plants could occur in this project. Of the 25 Region 5 designated sensitive plant species for the Stanislaus National Forest, 7 fall within the elevation range and habitats that could be affected by the Emigrant Dams. These are:

- *Bruchia bolanderi*
- *Epilobium howellii*
- *Hulsea brevifolia*
- *Hydrothyria venosa*
- *Meesia triquetra*
- *M. uliginosa*
- *Orthotrichum spjutii*

Three additional plants on the Region 5 sensitive species list were also considered in this analysis. Two of these species, *Botrychium ascendens* and *B. crenulatum*, are moonworts that were not originally included for the Stanislaus National Forest. A recent statewide survey of *Botrychiums* found more occurrences. The current known ranges indicate that these species could occur on this Forest. The third, *Draba asterophora*, is known from the Lake Tahoe area, but was previously reported from Yosemite in an area of metamorphic parent material. Many of these species occur in meadows.

One of these species, *Hydrothyria venosa*, is very unlikely due to the relative large flows and snowmelt scour that occurs in the streams below the dams. *Hydrothyria venosa* grows very slowly and is unable to survive where there is heavy scour. The flows where it is found are smaller than what occurs out of the lakes. For these reasons, it will not be discussed further in this analysis.

3.9.2. Surveys

Complete surveys for these species have not been conducted within the Emigrant Wilderness. Cooper and Whitesides meadows were surveyed in 2001 for the Cooper Range Allotment. The lower portion of Horse Meadow was surveyed and the trails along Bigelow Dam, Emigrant, Emigrant Meadow, and High Emigrant Lake were walked quickly during a survey of proposed trail maintenance at Emigrant Lake in 2002. Snow Lake was visited by bryologists and botanists in August 2003. A number of mosses were collected, but have not yet been fully identified. One occurrence of *Bruchia bolanderi* was found in Cooper Meadow. Surveys are not planned for this project.

3.9.3. Species Account and Habitat Status

The following section describes the Sensitive Plant species, which occur or might occur in this project and their State and federal statuses. Additionally, the suitable habitat is described for these Sensitive Plants. Suitable habitat for any species can be defined as the surroundings, substrate, and environmental factors which allow that species to successfully grow and reproduce.

3.9.3.1. *BOTRYCHIUM ASCENDENS* (STATUS: FS SENSITIVE)

Species Account

There are 11 known occurrences of *Botrychium ascendens* in California with an additional historical sighting at the Lake Tahoe Basin (Laeger and Carothers, 2002). The occurrences range from the Modoc to the Inyo National Forests. This species is widely scattered in Canada, Alaska, and Montana as well. There are no known occurrences on the Stanislaus National Forests. Few surveys have been made in this habitat.

Habitat Status

Botrychium ascendens has been found on the edges of seeps, springs, and streams and in fens and meadows. Reported elevations in California range from 5,000 to 10,000 feet. All but two occurrences are below 7,500 feet and to the north of the Stanislaus. The two to the south of the Stanislaus are both in meadows. Reported numbers range from 1 to 83 per occurrence.

3.9.3.2. *BOTRYCHIUM CRENULATUM* (STATUS: FS SENSITIVE)

Species Account

There are at least 32 known occurrences of *Botrychium crenulatum* in California (Laeger and Carothers, 2002). They range from the Modoc to the San Bernardino National Forests, as well as the Mendocino National Forest. Reported occurrence sizes range from 1 to 125 plants. *Botrychium crenulatum* is limited to the western states from California to Montana. There are no known occurrences on the Stanislaus National Forests. Few surveys have been made in this habitat.

Habitat Status

Botrychium crenulatum generally is found on the edges of seeps, springs, and streams and in fens and meadows and ranges from 5,800 to 10,000 feet elevation. It generally occurs below 6,500 feet to the north and above 6,000 feet to the south of the Stanislaus. Most of the occurrences to the south of the Stanislaus are in meadows.

3.9.3.3. *BRUCHIA BOLANDERI*

Species Account

There are at least 10 known occurrences in California and 3 on the Stanislaus National Forest (California Department of Fish and Game, 2002, Tibor 2001, personal observations). They range from the Lassen to the Sierra National Forests. There is one occurrence in

Cooper Meadow. There is one other occurrence in the Emigrant Wilderness. Numbers of plants are not recorded for mosses.

Bruchia bolanderi is a rare, inconspicuous moss. First described from Yosemite National Park, it has been found in the central Sierra Nevada and in Oregon (Christy, 1980). It is currently known from less than 20 occurrences. At known sites, areas of the occurrences are relatively small (USDA FS, 1998 (Shevock)).

Habitat status

Bruchia bolanderi occupies a specialized habitat within upper montane Sierran meadows (elevations approximately 5,000 to 8,500 feet), preferring vertical soil banks of small streams that meander through the meadows. It is somewhat ephemeral, dying back to the soil level. It can also occupy road cuts and head cuts.

3.9.3.4. DRABA ASTEROPHORA VAR. ASTEROPHORA

Species Account

There are five known extant populations in the Lake Tahoe Basin area. There is one occurrence from Mt. Gibbs that has not been seen since 1916 and another occurrence on the El Dorado National Forest that has not been relocated since 1978. There are no known occurrences on the Stanislaus National Forest. There have been few surveys in its habitat.

Habitat Status

Draba asterophora var. *asterophora* grows in rock crevices and alpine barrens in the subalpine to alpine zone. It generally occurs in areas with granitic parent materials, but was reported in an area of metasedimentary rock at the southern limit. It ranges in elevation from 8,000 to 11,500 feet.

3.9.3.5. EPILOBIUM HOWELLII

Species Account

There are only four known populations scattered between Yuba Pass and Huntington Lake and over to Twin Lakes on the east side of the Sierra. Two of these occurrences have not been relocated in recent revisits. The Stanislaus National Forest falls within that range, and there is one possible (unconfirmed) sighting on the Stanislaus. There have been few surveys in its habitat.

Habitat Status

It grows in meadows, seeps, and on *Salix* (willow) swales. On the Sierra National Forest, it occurs between 6,000 and 9,000 feet in elevation.

3.9.3.6. HULSEA BREVIFOLIA

Species Account

Based on information from the Sierra National Forest and the CalFlora Occurrences Database (<http://www.calflora.org/species/index.html>), there are at least 35 locations where

Hulsea brevifolia has been reported ranging from Tulare to Tuolumne counties. Approximately two-thirds of these sightings are on the Sierra National Forest. The remaining sightings are in Yosemite and Sequoia-Kings Canyon National Parks and Devil's Postpile National Monument. *Hulsea brevifolia* has not been found on the Stanislaus National Forest, but is known from the Tuolumne River watershed in Yosemite.

Habitat Status

Hulsea brevifolia grows on granitic or volcanic soils in relatively open canopy (Wilken, 1975). It has been found from 4,500 to 8,800 feet and in a range of vegetation types including chaparral, Ponderosa pine, mixed conifer, white fir, red fir, lodgepole, and aspen. It more often found above 6,000 feet on dry sandy or gravelly sites. It has also been found on road cuts and in harvested timber units.

3.9.3.7. MEESIA TRIQUETRA

Species Account

The geographic range for this species is primarily northwestern Canada and the northern half of Alaska, with disjunct occurrences in Oregon, Nevada, and California. *Meesia triquetra* is rare throughout its range. There are 33 collections in California, primarily in the Sierra Nevada (Dillingham, 2003). It has also been found in Humboldt and Siskiyou counties. No occurrences are currently known from the Stanislaus National Forest. There have been few surveys in its habitat.

Habitat Status

Meesia triquetra is a moss that grows in wet, somewhat acidic meadows and fens. It is often associated with Sphagnum moss and sometimes occurs with *Vaccinium uliginosum*. The elevation range is approximately 6,000 to 9,500 feet.

3.9.3.8. MEESIA ULIGINOSA

Species account

The geographic range includes Alaska, Canada, and Greenland. There are 10 herbarium records from California stretching from Siskiyou to Tulare counties with most occurrences in the southern Sierra Nevada (USDA Forest Service, 1998). It has been found on the Sierra and Tahoe National Forests, but has not yet been found on the Stanislaus National Forest. There have been few surveys in its habitat.

Habitat Status

Meesia uliginosa grows in meadows and seeps with members of the *Carex luzulina* complex. It is sometimes found on or near logs. The elevation range is approximately 6,500 to 9,500 feet.

3.9.3.9. ORTHOTRICHUM SPJUTII

Species Account

Orthotrichum spjutii, a moss, is known in California from a single site near Leavitt Lake east of Sonora Pass. It also occurs in Nevada.

Habitat Status

Very little is known about its habitat. It grows on granitic rocks in diffuse light and moist conditions. The occurrence in California is at 9,600 feet.

3.9.4. Sensitive Plant Habitat at the Dams

Since surveys were not done for this project, the following section will discuss what is known about suitable habitat for sensitive plants at each dam location. Anticipated effects from this project include collection and transportation of sand, rock, clay, and sod to the dams, transport of materials to the site from outside of the wilderness, use of the area by those working on the dams, and changes to water level and streamflow. The area closest to the dams would be the most impacted. Any meadows around the lakes could also be impacted, as well as lakeshore. Rocky areas could be impacted as well. Since the sensitive plants primarily grow in meadows, the focus will be on meadows adjacent to the lakes behind the dams and those adjacent to the dams.

An assumption is that meadow wetness below the dam would not be affected much by the project. The effect in those areas would be confined to streamflow and the associated riparian vegetation. The streams below the dams probably have too high of flow to support *Hydrothyrta venosa*.

Meadow areas are reported to the nearest acre since they are derived from photographs and are approximate. Meadow information derives from a GIS layer created from aerial photos. This layer contains most of the meadows on the forest, and included some patches of mule's ear (*Wyethia mollis*) and whitethorn (*Ceanothus cordulatus*). For the meadows near the dams, range maps have been used to identify more meadows. These meadows were entered into GIS based on orthophotos. The areas reported were derived in GIS.

Meadows are the habitat for most of the sensitive species that could be affected by this project. There are approximately 845 meadows covering 5,500 acres on the Stanislaus National Forest between 7,700 and 9,800 feet in elevation and 313 meadows totaling 2,900 acres at that elevation range in the Emigrant Wilderness. Based on the same meadow layer in GIS, there are 31 meadows totaling 546 acres that are contiguous with dams or the lakes behind the dams.

Wet meadows are the predominant type of meadow in the Emigrant Wilderness (USDA Forest Service 1996). Several of the sensitive plants occur primarily in fens, which are wetlands with soils that are primarily composed of organic fibers. These usually occur in small areas within some meadows.

Table 3-32 Sensitive Plants or Suitable Habitat

Dam	Elevation (Ft.)	Meadow (Acres)	Sensitive Species (Habitat if not surveyed)	Surveys
Snow Lake	9,355	18 acres, 9 are wet and productive	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Draba asterophora</i> var. <i>asterophora</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	No surveys, no sensitive plants known
Bigelow Lake	9,591	21 acres	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Draba asterophora</i> var. <i>asterophora</i>	No surveys, no sensitive plants known
Horse Meadow	8,460	60 acres, some may be wetland	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Bruchia bolanderi</i> <i>Hulsea brevifolia</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	Surveyed wet area nearest the dam. No sensitive plants known.
Huckleberry Lake	7,856	71 acres Much less is wet, productive	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Bruchia bolanderi</i> <i>Epilobium howellii</i> <i>Hulsea brevifolia</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	No surveys, no sensitive plants known
High Emigrant Lake	9,706	30.8 acres in 2 large meadows	<i>Botrychium ascendens</i> <i>B. crenulatum</i>	No surveys, no sensitive plants known
Emigrant Meadow Lake	9,407	33 to 63 acres. See discussion	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	No surveys, no sensitive plants known
Middle Emigrant Lake	9,335	18 acres	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	No surveys, no sensitive plants known
Emigrant Lake	8,827	44 acres	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	Surveyed along trail only, 2002. No sensitive plants known.
Cow Meadow	7,780	14 acres	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Bruchia bolanderi</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	No surveys, no sensitive plants known
Red Can Lake	8,296	2 acres	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Bruchia bolanderi</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	No surveys, no sensitive plants known

Dam	Elevation (Ft.)	Meadow (Acres)	Sensitive Species (Habitat if not surveyed)	Surveys
Leighton Lake	8,279	6 acres	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Bruchia bolanderi</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	No surveys, no sensitive plants known
Yellowhammer Lake	7,723	0 acres	<i>Botrychium ascendens</i> <i>B. crenulatum</i>	No surveys, no sensitive plants known
Long Lake	8,696	4-27 acres, see discussion	None, poor habitat near any areas that could be impacted.	No surveys, no sensitive plants known
Lower Buck Lake	8,305	None mapped, small patches noted	<i>Botrychium crenulatum</i>	No surveys, no sensitive plants known
Y-Meadow	8,590	5 acres	No suitable habitat affected	No surveys, no sensitive plants known
Bear Lake	7,691	13 acres	<i>Botrychium ascendens</i> <i>B. crenulatum</i> <i>Bruchia bolanderi</i> <i>Epilobium howellii</i> <i>Hulsea brevifolia</i> <i>Meesia triquetra</i> <i>M. uliginosa</i>	No surveys, no sensitive plants known
Cooper Meadow	8,390	114 acres	<i>Bruchia bolanderi</i> present	
Whitesides Meadow	8,795	58 acres	No sensitive plants found	Surveyed 2001

Snow Lake

Snow Lake has 9 acres of wet meadow and 9 acres of drier, much less productive meadow. Part of it is on the only roof pendant on the Stanislaus National Forest and is reported to have some calcareous substrate, particularly near the mines (USDA Forest Service, 1996). This habitat is very uncommon at high elevation and could have rare plants. The trail passes near the dam.

Bigelow Lake

Bigelow Lake is on the same roof pendant as Snow Lake. It is less likely to have calcareous substrates based on the pH of the lake and the absence of light colored bands (J. Frazier, personal communication). There are two meadows totaling 21 acres. Range surveys show they are relatively unproductive meadows.

Horse Meadow

Horse Meadow is a 60-acre meadow. The lower end may be a wetland. The upper portion has drift fences at both ends and it is often used for pack stock. A soil type that could support *Hulsea brevifolia* is present, but that soil type is over 0.1 miles from the dam and is unlikely to be an area used as a rock source. The lower end of the meadow has been

surveyed and no sensitive plants were found. This area has relatively low diversity. Wet conditions over a large area may favor just a few species that can tolerate the saturated conditions.

Huckleberry

Huckleberry Lake has a mixture of wet meadow and wetlands in several areas. Although the meadow area totals 71 acres, a large portion is scattered with trees and is not very productive. Approximately 28 acres are wet meadow and wetland. Access to the dams will affect a small meadow. The most likely soils for *Hulsea brevifolia* are not near the dams.

High Emigrant Lake

High Emigrant Lake is in a low slope area near the crest of the Sierra. It is the one lake in the project on volcanic substrate. Two large meadows surround the lake and extend away from it totaling over 30 acres (GIS layer). Range only shows one 7-acre meadow. Based on the orthophotos there appear to be two meadows of 7 acres each. Willows are present.

Emigrant Meadow Lake

Emigrant Meadow Lake has a very large meadow on the opposite side of the lake from the dam. The meadow is 33 to 44 acres. An additional 19 acres have been mapped as both meadow and lake in GIS and as wetland on the range map. The meadow is highly productive and the underlying soil is mapped as alluvium.

Middle Emigrant Lake

Middle Emigrant Lake has a large 18-acre meadow at the far end of the lake from the dam. The meadow is mapped as wet and dotted with ponds.

Emigrant Lake

Emigrant Lake has a large 44-acre meadow at the far end from the dam and small meadows and wetlands scattered along the northern shore. This meadow is wetter than the meadows above it in the watershed and is very productive. There is another 9-acre meadow below the dam.

Cow Meadow Lake

Cow Meadow Lake has a 14-acre meadow away from the dam. The meadow is quite wet according to the range survey with a large amount of *Carex nebrascensis*. Part of the meadow is fenced and so it receives stock use. It is considered by one range conservationist to be a unique area and very productive (C. Holland, Personal communication). The main dam failed several years ago. Apparently, any previously flooded areas have revegetated.

Red Can Lake

There are two small meadows mapped on aerial photos totaling 2 acres. They are at the far side of the lake from the dam. The area around the lake is mapped as 100% rock outcrop. Range records do not show any meadows here.

Leighton Lake

There are two meadows mapped on aerial photos totaling 6 acres. They are at the far side of the lake from the dam. The area around the lake is mapped as 100% rock outcrop. Range records do not show any meadows here. Nearby meadows are low yield, but had *Scirpus* sp., so they could be wet in places. The outlet conduit cannot be closed, so the dam releases water faster than what was originally intended.

Yellowhammer Lake

There are no meadows at Yellowhammer Lake. The area around the lake is granite rock; therefore, there is no suitable habitat at the Lake. The dam no longer impounds water.

Long Lake

Meadow area estimates vary greatly for this meadow from between 4 acres (GIS meadow layer) up to 27 acres (range report). Much of the area mapped in the larger estimate is very patchy. According to the range transect, the meadow type has few graminoids, mostly very small species, and has some woody species including willows. This type of meadow is unlikely to be suitable habitat for any of the sensitive plants that can occur in meadows. In addition, the meadows are away from the dam. The area near the dam is mostly granitic rock and is not suitable habitat for sensitive plants.

Lower Buck Lake

There is very little meadow at Lower Buck Lake. It is noted but not mapped as being in small patches by the edge of the lake in the range report. One small patch could be impacted by access from the trail. The area around the lake is mapped as rock. The only suitable habitat is lake edge, which could be habitat for *Botrychium crenulatum*. There is very little of this habitat due to the rocky surrounding.

Y-Meadow

Y-Meadow Lake has not been surveyed for sensitive plants. There is no meadow around the lake and a meadow approximately five acres in size is below the dam. The meadow is one of the wettest types based on data from a range study. Dominant species included *Carex nebrascensis* and *Scirpus* sp. The trail is within 0.1 mile of the dam, so there is apparently no need to pass through the meadow to reach the dam. Fens are unlikely due to the high position in this watershed (J. Frazier, personal communication).

Bear Lake

The meadows around the lake are not near the dam. A wetter meadow exists above the lake that could be a source for colonization if sensitive plants are present and further habitat becomes available. The southwest side of the lake has soil that is the most likely for *Hulsea brevifolia*. The proximity of red fir (*Abies magnifica*) may be a better indicator of suitable habitat for *Hulsea brevifolia* (J. Clines, personal communication). Red fir is mapped as near this site and is the site most likely to have *Hulsea brevifolia*.

Cooper Meadow

Cooper Meadow was surveyed in 2001 using a species list that included most of the species under consideration in this document. One sensitive plant species was found, *Bruchia bolanderi*. It occurs on a stream bank upstream from the influence of the dam.

Whitesides Meadow

Whitesides Meadow was also surveyed in 2001. No sensitive plants were found.

3.9.5. Effects Analysis

This analysis is organized by habitat groupings. There are four habitat groupings for sensitive plants:

1. Within the stream channel
2. Meadows
3. On rocky slopes
4. On large rock faces

Impacts for each habitat grouping will be considered for each alternative. Because surveys have not and will not be completed as a part of this project, presence will be assumed for sensitive plants where there is unsurveyed suitable habitat. This analysis falls primarily under the natural processes issue since plant distribution is affected by natural processes.

The types of impacts that could affect sensitive plants include:

- Rock, sod, and clay collection for dam repair
- Large and rapid release of water due to dam failure
- Changes in water level with changes in dam maintenance and use
- Trampling and soil compaction in work areas
- Introduction of noxious weeds
- Grazing by pack stock associated with dam repair and reconstruction

These potential impacts would occur primarily in the area adjacent to each dam. They could also affect meadows around the edges of the lakes, stream channels below the dams, and areas where materials for dam repair are collected.

3.9.5.1. ALTERNATIVE 1 – PROPOSED ACTION

Stream Habitat (*Botrychium ascendens* (in part), *B. crenulatum* (in part), and *Bruchia bolanderi*)

Bruchia bolanderi is found in the largest amounts on the banks of streams below bank full. It can also occur on root mounds of wind thrown trees or scattered under other vegetation (Christy 1980), but locations known so far on the Stanislaus National Forest are on stream banks or a similar condition of a road bank above standing water. The known *Bruchia bolanderi* occurrence in Cooper Meadow would not be affected by the actions that are a part of any of the alternatives of this project. There is possible habitat for *Bruchia bolanderi* below other dams that has not been surveyed. *Botrychium ascendens* and *B. crenulatum*

can also occur on stream banks. They are generally just above bank full where they would mainly be affected by flooding. They will be covered in the meadow section as well.

3.9.5.1.1. Direct and Indirect Effects

There would be no direct effects to these stream bank species, as no suitable habitat exists in the areas that would be affected by dam repair and maintenance activities. The possible indirect effect would be from erosion or excessive scour of the streambank and adjacent floodplain if a dam fails while retaining water. This alternative minimizes that possibility by maintaining the dams that impound the most water. In addition, management direction provides for removal if there is a safety concern (USDA Forest Service, 2002). The potential failure of a dam while retaining water could be a safety concern.

An additional indirect effect would be from the introduction of noxious weeds. The likelihood of this is very low due to management requirements for the use of weed free feed and for cleaning equipment. Of the most likely noxious weeds that could be introduced into the wilderness, whitetop (*Cardaria pubescens*), Canada thistle (*Cirsium arvense*), and ox-eye daisy (*Leucanthemum vulgare*) can grow along streams and could affect this habitat the most (See Appendix C – Noxious Weed Risk Assessment)

3.9.5.1.2. Cumulative Effects

There are no anticipated direct effects from this alternative and potential indirect effects have been mitigated; therefore, there are no cumulative effects to the species under Alternative 1.

Meadow Habitat (*Botrychium ascendens* (in part), *B. crenulatum* (in part), *Epilobium howellii*, *Meesia triquetra*, and *M. uliginosa*)

These meadow species vary in timing of growth and in the degree of wetness where they are found. The meesias are generally found in fens or very wet areas. These areas are very limited, occurring in small areas in some of the meadows. *Epilobium howellii* is found on drier sites within meadows. The *Botrychiums* are found in a variety of habitats. They can also occur in fens. In the absence of surveys, the area of meadow affected will be used as an indicator in this analysis.

3.9.5.1.3. Direct and Indirect Effects

In most cases, meadows would be avoided during dam repair. There could be some impacts from stock animals, but these would meet the standards established for cattle allotments, which are intended to reduce impacts. Impacts in a particular area would generally occur during a single season. As mentioned above, the spread of weeds has been mitigated.

There could be direct effects to meadows at Huckleberry Lake during dam repair (R. Wisehart and M. Dodds, personal communications). The meadow is very small and does not show on any of the maps. It may have been created by or is being maintained by one of the dam segments. For the purpose of this analysis, it is assumed to be less than an acre. This is less than 1% of the total meadow area in the immediate project area. The extent of impacts, if any, are unknown for this alternative, but are unlikely to affect the entire meadow. In addition, a 400 square foot area of meadow would have sod harvested for the repair of

Leighton dam. This would probably come from a meadow below the dam. Again, this meadow is so small that it does not appear on any maps. The sod would probably come from an area with high clay content, since high organic matter soil could decay and compact over time. Therefore, the meesias, which generally occur on histisols (soils with high organic fiber content in at least the top 16 inches), would not be affected by the sod collection. Botrychiums could be affected in both locations and *Epilobium howellii* could be affected at the Huckleberry Lake site. This affect would be much less than 1% of total possible habitat near project dams. The specification that the sod be collected in strips on the contour would increase the ability of adjacent plants to recolonize readily. Placing the strips on the contour alternating with intact vegetation would allow the collection of sediment moving down slope and avoid channeling water downhill. Mitigation of bringing in sod from outside the wilderness was considered and dismissed due to the potentially large effects if a non-native species was introduced that could spread and compete with native plants.

There would also be indirect effects to several, much larger meadow areas. As stated in the watershed effects, 4 acres of meadow and riparian habitat would be gained at Red Can Lake and Horse Meadow as the dams cease to function. Eighteen acres of habitat would be lost if the dam at Cow Meadow Lake is reconstructed. This would be a net loss of 14 acres. All of this is habitat that has previously been impacted through inundation by the dams and was underwater until less than 10 years ago.

3.9.5.1.4. Cumulative Effects

This alternative would have a net negative effect on 15 acres of meadow and riparian habitat through inundation, sod collection, and dam repair activities. Most of these impacts would occur in areas that have been subject to impact when the dams were constructed and had been inundated until the late 1990s. All other planned activities that could impact meadows, primarily trail work, have been mitigated through the use of or planned use of surveys before the action. One other known effect to meadows is the dewatering process that has occurred when downcutting from a head cut drops the water table until it is no longer suitable for the sensitive plants and many other meadow species. This process has affected and is probably continuing to affect other wet meadows in the Emigrant Wilderness. Downcutting has affected a 7-acre meadow north of Emigrant dam and a 6-acre meadow below Middle Emigrant dam (pers. obs). It is not known over what period of time this occurred, how common this is across the landscape, or what the causes are. Overall, this project is confining impacts to areas where impacts have occurred in the past. This alternative is affecting less than 1% of the total meadow area within the elevation range of the project in the Emigrant Wilderness.

Large Rocks (*Orthotrichum spjutii*)

3.9.5.1.5. Direct and Indirect Effects

Orthotrichum spjutii occurs on large rocks or rock outcrops. This habitat has been protected by a management requirement that would prevent breaking up large boulders or rock faces to use as a source for smaller rocks. Therefore, there would be no direct or indirect effects to *Orthotrichum spjutii*.

3.9.5.1.6. Cumulative Effects

Since there would be no direct or indirect effects in these alternatives, there would be cumulative effects for *Orthotrichum spjutii*.

Slopes with Rocks (*Arabis tiehmii*, *Draba asterophora* var. *asterophora*, and *Hulsea brevifolia*)

These species occur on high elevation rocky slopes of various types. The most likely habitat for *Arabis tiehmii* is near the Sierra crest since it primarily occurs on the east side of the crest. This would include High Emigrant Lake and Snow Lake. The most likely habitat for *Draba asterophora* var. *asterophora* is at Snow and Bigelow lakes where there is metamorphic rock. It is reported to occur on metamorphic rock at the occurrence in Yosemite, the closest occurrence to the project area. The most likely habitat for *Hulsea brevifolia* is a Bear Lake and Huckleberry Lake based on soil and vegetation types.

3.9.5.1.7. Direct and Indirect Effects

These species could be affected by rock collection for dam repair. At High Emigrant Lake, all of the 215 rocks needed are within a few hundred feet of the dam. At Snow Lake, an estimated 100 rocks would be needed and they might need to come from about 1,000 feet away. There is a management requirement to prohibit collection of rocks in the areas with metamorphic rocks to protect the most likely suitable plant habitat. Only 10 rocks are needed at Bigelow Lake and they are going to be collected within a few hundred feet of the dams. The most likely habitat for the draba is on the other side of the lake. At Bear Lake, which has the most likely habitat for *Hulsea brevifolia*, the dam is not proposed for maintenance. At Huckleberry Lake, only 50 rocks are needed and would be collected near the dam. The most likely soils for *Hulsea brevifolia* are not near the dam.

Most of the suitable plant habitat for these species has been protected through management requirements. All of these species occur primarily to the north or the south of the Forest and are less likely in the analysis area because it is at the limit of their ranges. Rock collection would only affect a small portion of the suitable habitat in the project area as close to the dams as possible. Any species that is present in those locations has survived a greater impact in the past when the dams were constructed or has been able to recolonize afterwards. This action is unlikely to affect the viability of any occurrences.

3.9.5.1.8. Cumulative Effects

This alternative could have short-term effects to *Arabis tiehmii*. It is not likely to affect the viability of any occurrence that may be here, and therefore would not add to cumulative effects. The most suitable habitat for *Draba asterophora* var. *asterophora* and *Hulsea brevifolia* would not be affected by this alternative and so there would be no direct or indirect effects to those species.

3.9.5.2. ALTERNATIVE 2 – No Action

Stream Habitat (*Botrychium ascendens* (in part), *B. crenulatum* (in part), and *Bruchia bolanderi*)

Bruchia bolanderi is found in the largest amounts on the banks of streams below bank full. It can also occur on root mounds of wind thrown trees or scattered under other vegetation (Christy 1980), but locations known so far on the Stanislaus National Forest are on stream banks or a similar condition of a road bank above standing water. The known *Bruchia bolanderi* occurrence in Cooper Meadow will not be affected by the actions that are a part of any of the alternatives of this project. There is possible habitat for *Bruchia bolanderi* below

other dams that has not been surveyed. *Botrychium ascendens* and *B. crenulatum* can also occur on stream banks. They are generally just above bank full where they would mainly be affected by flooding. They will be covered in the meadow section as well.

3.9.5.2.1. Direct and Indirect Effects

There would be no direct effects under Alternative 2 because there would be no dam maintenance. There would be more likelihood of dam failure in this alternative because all of the dams would be allowed to decay. As in Alternative 1, dams could be removed or breached or the valves left open or removed if they reached a state where failure was possible. This stage could occur 10 to 100 years in the future in most cases (Wisehart 2003).

In this alternative, as the dams failed, flow regimes would change. There could be higher peak flows and less of a sustained flow over the course of the summer. Two of the known occurrences of *Bruchia bolanderi* are on unregulated streams where they are subject to periodic flooding. It is unknown how many of the occurrences of these species on other forests are affected by dams. In this alternative, occurrences that are established below dams could be negatively affected in the short term by flow changes. Since the known occurrences are in areas above any dams, it is possible that this alternative would create more suitable habitat in the long term.

Additionally, more acres of meadow could be recreated in this alternative as the dams cease to function. Since *Bruchia bolanderi* usually grows on stream banks in meadows, this would create additional possible habitat. In both of these cases, the degree of occupancy of this habitat would depend on the ability of *Bruchia bolanderi* to spread to those sites. This would affect the botrychiums less since they occur in other types of streamside habitat also.

3.9.5.2.2. Cumulative Effects

The short-term effects of this project could be negative. The long-term effect would likely be positive since additional habitat would be created with an undammed flow regime. The overall change to cumulative effects would be positive. There are no other known impacts or planned impacts to occurrences of *Bruchia bolanderi* on this forest.

Meadow Habitat (*Botrychium ascendens* (in part), *B. crenulatum* (in part), *Epilobium howellii*, *Meesia triquetra*, and *M. uliginosa*)

These meadow species vary in timing of growth and in the degree of wetness where they are found. The meesias are generally found in fens or very wet areas. These areas are very limited, occurring in small areas in some of the meadows. *Epilobium howellii* is found on drier sites within meadows. The Botrychiums are found in a variety of habitats. They can also occur in fens. In the absence of surveys, the area of meadow affected will be used as an indicator in this analysis.

3.9.5.2.3. Direct and Indirect Effects

Under this alternative, there would be no direct effects. The primary indirect effect would be due to the changes in flow patterns as the dams cease to function. This could occur slowly over time or quickly. None of the dams are expected to release a large load of sediment downstream (Watershed, Section 3.1). In all lakes except Y-Meadow, the sediment would

remain in the natural lake. At Y-Meadow, the materials from the dam could form a check dam. Over the long term, this alternative would likely recreate up to 156 acres of meadow and riparian habitat. This would lead to an increase in suitable habitat. Whether that habitat becomes occupied would depend on the proximity of sensitive plants in the area. That is particularly likely at Bear Lake where there is an unaffected meadow above the affected meadow. Some meadow habitat may be a drier type due to the accumulation of sediments while inundated. For this reason, the 20 acres that was flooded by the dam at Y-Meadow are not included in this calculation. These changes would take place over 10 to 100 years (Wisehart, 2003).

3.9.5.2.4. Cumulative Effects

This alternative would be beneficial and would increase the area of meadows in the Emigrant Wilderness over time. There are no known negative effects.

Large Rocks (*Orthotrichum spjutii*)

3.9.5.2.5. Direct and Indirect Effects

No dam repair or reconstruction would occur in this alternative. There would be no direct or indirect effects to *Orthotrichum spjutii* in this alternative.

3.9.5.2.6. Cumulative Effects

Since there are no direct or indirect effects, there are no cumulative effects for *Orthotrichum spjutii*.

Slopes with Rocks (*Arabis tiehmii*, *Draba asterophora* var. *asterophora*, and *Hulsea brevifolia*)

These species occur on high elevation rocky slopes of various types. The most likely habitat for *Arabis tiehmii* is near the Sierra crest since it primarily occurs on the east side of the crest. This would include High Emigrant Lake and Snow Lake. The most likely habitat for *Draba asterophora* var. *asterophora* is at Snow and Bigelow lakes where there is metamorphic rock. It is reported to occur on metamorphic rock at the occurrence in Yosemite which is the occurrence closest to the project area. The most likely habitat for *Hulsea brevifolia* is a Bear Lake and Huckleberry Lake based on soil and vegetation types.

3.9.5.2.7. Direct and Indirect Effects

Since rocks would not be collected in this alternative, there would be no direct or indirect effects to these three species.

3.9.5.2.8. Cumulative Effects

Since there are no direct or indirect effects, there are no cumulative effects for *Arabis tiehmii*, *Draba asterophora* var. *asterophora*, and *Hulsea brevifolia*.

3.9.5.3. ALTERNATIVE 3 – HERITAGE RESOURCES

This alternative is intermediate between the other two alternatives and its effects are a combination of those for alternatives 1 and 2. The only situation that differs from some combination of the two alternatives is that in this alternative the dam at Red Can Lake would be maintained. This is a very small dam with the smallest capacity of any of the lake dams, so this is not a very large difference.

Stream Habitat (*Botrychium ascendens* (in part), *B. crenulatum* (in part), and *Bruchia bolanderi*)

Bruchia bolanderi is found in the largest amounts on the banks of streams below bank full. It can also occur on root mounds of wind thrown trees or scattered under other vegetation (Christy 1980), but locations known so far on the Stanislaus National Forest are on stream banks or a similar condition of a road bank above standing water. The known *Bruchia bolanderi* occurrence in Cooper Meadow would not be affected by the actions that are a part of any of the alternatives of this project. There is possible habitat for *Bruchia bolanderi* below other dams that has not been surveyed. *Botrychium ascendens* and *B. crenulatum* can also occur on stream banks. They are generally just above bank full where they would mainly be affected by flooding. They will be covered in the meadow section as well.

3.9.5.3.1. Direct and Indirect Effects

As in Alternative 1, seven dams that currently retain water would be maintained. Six of the dams that were maintained in Alternative 1 would be allowed to decay. The indirect effects of dam failure and weed introduction would be mitigated in this alternative. This alternative would result in habitat creation to a lesser extent than Alternative 2. The overall long-term effect would be positive to the extent that the additional suitable habitat is utilized.

3.9.5.3.2. Cumulative Effects

As in Alternative 2, the overall change to cumulative effects would be positive.

Meadow Habitat (*Botrychium ascendens* (in part), *B. crenulatum* (in part), *Epilobium howellii*, *Meesia triquetra*, and *M. uliginosa*)

These meadow species vary in timing of growth and in the degree of wetness where they are found. The meesias are generally found in fens or very wet areas. These areas are very limited, occurring in small areas in some of the meadows. *Epilobium howellii* is found on drier sites within meadows. The *Botrychiums* are found in a variety of habitats. They can also occur in fens. In the absence of surveys, the area of meadow affected will be used as an indicator in this analysis.

3.9.5.3.3. Direct and Indirect Effects

In this alternative, most of the dams that originally flooded meadows would be allowed to deteriorate. A total of 57 acres of meadow and lakeside habitat would be restored. In this alternative, sod would be collected for Red Can dam repair, as well as for Leighton. The repair at Red Can would require 10 cubic feet of sod (40 ft.² and 3" thick). This would bring to total area of sod harvest at the two sites to 440 ft². There would not be any potential impact to the meadow near the Huckleberry dams in this alternative so suitable habitat for

Epilobium howellii would not be affected. Except for the small area at Red Can, the effects of this alternative are intermediate between Alternatives 1 and 2 and have been mitigated. Although there are effects at Red Can and Leighton, the overall effect of this alternative would be beneficial by increasing meadow habitat.

3.9.5.3.4. Cumulative Effects

The effects to small areas at Red Can and Leighton dams could affect individual plants, but would be a very small contribution to the overall cumulative effects. The overall and long-term effect would be positive.

Large Rocks (*Orthotrichum spjutii*)

3.9.5.3.5. Direct and Indirect Effects

Same effects as Alternative 1.

3.9.5.3.6. Cumulative Effects

Same effects as Alternative 1.

Slopes with Rocks (*Arabis tiehmii*, *Draba asterophora* var. *asterophora*, and *Hulsea brevifolia*)

These species occur on high elevation rocky slopes of various types. The most likely habitat for *Arabis tiehmii* is near the Sierra crest since it primarily occurs on the east side of the crest. This would include High Emigrant Lake and Snow Lake. The most likely habitat for *Draba asterophora* var. *asterophora* is at Snow and Bigelow lakes where there is metamorphic rock. It is reported to occur on metamorphic rock at the occurrence in Yosemite which is the occurrence closest to the project area. The most likely habitat for *Hulsea brevifolia* is a Bear Lake and Huckleberry Lake based on soil and vegetation types.

In this alternative, only rock collection at Bigelow Lake could affect these species.

3.9.5.3.7. Direct and Indirect Effects

The most likely habitat for *Draba asterophora* var. *asterophora* is on the higher slopes on the opposite side of the lake from the dam. This is too far away to be affected by rock collection for the dam. Therefore, there would be no direct or indirect effects to these three species under this alternative.

3.9.5.3.8. Cumulative Effects

Since there are no direct or indirect effects, there are no cumulative effects for *Arabis tiehmii*, *Draba asterophora* var. *asterophora*, and *Hulsea brevifolia*.

3.9.6. Determination of Effects

Surveys have not been completed and would not be completed prior to implementation. A series of management requirements have been created to protect the most likely sensitive plant habitat from disturbance by the action alternatives (Mitigation, Section 2.6). These

requirements include avoiding or minimizing impacts to certain habitat and preventing the introduction of weeds, which could compete with sensitive plants.

Species	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3 Heritage
<i>Botrichium ascendens</i>	MAINL	NA	MAINL*
<i>Botrychium crenulatum</i>	MAINL	NA	MAINL*
<i>Bruchia bolanderi</i>	NA	MAINL*	MAINL*
<i>Draba asterophora</i> var. <i>asterophora</i>	NA	NA	NA
<i>Epilobium howellii</i>	MAINL	NA	NA
<i>Hulsea brevifolia</i>	NA	NA	NA
<i>Meesia triquetra</i>	NA	NA	NA
<i>Meesia uliginosa</i>	NA	NA	NA
<i>Orothotrichum spjutii</i>	NA	NA	NA

NA: No affect

MAINL: May affect individuals, but not likely to lead to a trend toward listing or loss of viability

Mail:** May affect individuals and likely to lead to a trend toward listing or loss of viability

*Individuals would be affected; however, the overall effect is positive

**Trigger for a Significant Action As Defined In NEPA

3.10. SOCIAL AND ECONOMIC

In 2002, almost 66,000 Recreation Visitor Days (RVDs) were estimated to occur in the Emigrant Wilderness. The most recent data available regarding the origin of visitors to the Wilderness was compiled as percentage of total use from 1991-1994 (Emigrant Wilderness Management Plan, 1998, p. 189). Table 3-33 displays these percentages by method of travel and county(s) of origin. This table shows that while 10% of visitors came from outside the state, 9.5% came from four local counties, 16% came from neighboring counties, and over half came from the San Francisco Bay area. In terms of overnight use, approximately 31% was estimated to occur in dam/lake areas. Data on the origin of visitors who specifically visited the dammed lakes is not available. Further, no data is available on the socio-economic characteristics of Emigrant visitors.

While these use statistics indicate the majority of visitors come from outside the immediate area, many locals also recreate in the Wilderness. Visitors from outside the area spend money on lodging, meals, transportation, and other goods and services in the counties near the wilderness, and thus contribute to income and employment in these counties. Consequently, there are two primary ways in which the wilderness contributes to the Social and Economic well being in the local area. The first is the use and non-use values locals personally derive from the wilderness and the second is the contribution to local economic activity generated when people visit the wilderness. Most of the tourism related expenditures associated with recreating in the Emigrant occur within the four local counties of Tuolumne, Calaveras, Alpine and Mariposa, which for the purpose of this project will be called the Emigrant region.

Table 3-33 Origin of Emigrant Wilderness Visitors (1991-94)

Method of Travel	County(s) of Origin						Out of State or Unknown
	Local	Neighbor	Bay Area	Sac. Area	So Cal	Nor Cal	
Foot	7.0%	10.0%	50.0%	4.0%	6.0%	2.5%	3%
Private Stock	2.2%	4.0%	1.5%	0.5%	0.6%	0.2%	
Outfitted Stock	0.3%	2.0%	2.0%	0.3%	0.6%	0.3%	7%
Total**	9.5%	16%	53.5%	4.8%	7.2%	3%	10.0%
Local	= Tuolumne, Calaveras, Alpine, Mariposa Counties						
Neighbor	= Stanislaus, San Joaquin, Merced, Madera Counties						
Sacramento	= Sacramento, Sutter, Yolo, Amador, El Dorado Counties						
Bay Area	= San Francisco, Marin, Sonoma, Solano, Contra Costa, Alameda, Santa Clara, San Mateo, Santa Cruz Counties						
Southern CA	= Counties in California south of those listed above						
Northern CA	= Counties in California north of those listed above						
Out of State	= All other states, foreign or unknown						
**Total does not add up to 100% due to rounding							

This Affected Environment section contains three subsections. The first subsection describes the economic structure and socio-economic characteristics of the four local counties. The second subsection examines the existing local social, cultural, and recreational values associated with the wilderness. The last subsection examines wilderness values for the public at large.

3.10.1 Local Region Population, Economic Structure, & Socioeconomic Characteristics

3.10.1.1. POPULATION

Table 3-34 shows that in 2000, the total population of the four-county region was approximately 113,393. Tuolumne County had both the largest population (54,501) and largest land area (1,430,660 acres), while Alpine county has the fewest residents (1,208) of any county in the state. The populations of all four counties are predicted to grow between 2000 and 2020, with the Calaveras population predicted to increase by 53% and the others predicted to increase between 41 and 42%.

Table 3-34 County Population and Projections, 2000-2020

County	Year				
	2000	2005	2010	2015	2020
Alpine	1,208	1,300	1,400	1,600	1,700
Calaveras	40,554	47,800	53,400	57,900	62,200
Mariposa	17,130	19,600	21,500	23,000	24,300
Tuolumne	54,501	62,200	68,200	72,800	77,200
Total	114,700	130,900	144,500	155,300	165,400
Bay Area	7,101,300	7,528,700	7,930,700	8,202,200	8,550,300

Source: U.S. Census Bureau 2002; State of California, Department of Finance, 2001.

3.10.1.2. ECONOMIC STRUCTURE

Table 3-35 displays some basic employment statistics for California, the local region, and the four individual counties. Nonfarm employment is defined as all employment, both full- and part-time, not associated with farming. Government data made available to the public are subject to nondisclosure rules. This applies when the data reported may disclose the operations of a single firm. Due to nondisclosure for several sectors in the smaller counties, these sectors were lumped into the "Other" category. Employment in this table is measured in annual equivalents, or the yearly average of all full- and part-time jobs. A person who works 12 months at a full-time job is counted as one job. A person who works three seasonal or part-time jobs during the year would be counted as three jobs. This measure is not the same as a full-time equivalent (FTE). An FTE is equal to one person working full time for 12 months; three people each working full time for 4 months would be counted as a single FTE. In considering the employment data presented, the annual equivalent count may overstate or understate some sectors depending on its level of seasonal or part-time hiring.

The 2000 distribution of employment by industry sector in the Emigrant region differs in some respects from the state of California as a whole. The region had 4% more of its employment in construction, 5% more in government, 6% less in manufacturing, and 5% less in the "other" category. The industrial sectors associated with serving tourists are not easily identified, but have been defined to include the following (Bureau of Economic Analysis, 2003):

- Hotels and lodging places
- Eating and drinking places
- Railroads and related services
- Local and bus passenger transit, taxicabs, air transportation, water transportation, automotive rental, and leasing
- Travel agency services
- Amusement and recreation services
- Membership sports and recreation clubs
- Motion pictures and other entertainment
- Professional sports clubs and promoters
- Gasoline service stations
- Retail, excluding restaurants and gas stations

With the exception of the transportation related businesses, most of these businesses fall within the broader sectors of retail trade and services. Table 3-35 shows the Emigrant region had 2% more employment in the retail trade sector, but 1% less employment in the services sector compared to the state of California as a whole. Examining these two sectors for the individual counties reveals that Alpine county, which contains two ski areas, had an extremely large proportion (70%) of its employment in the services sector. Mariposa County also had a larger proportion of its employment in this sector than the region or state did. Tuolumne County had the largest percentage of employment in the retail trade sector.

Table 3-35 2000 Employment by Industry for CA and Emigrant Region

Nonfarm Employment by Sector	California	Emigrant Region	Alpine County	Calaveras County	Mariposa County	Tuolumne County
	Jobs (percent)					
Construction	1,040,795 (5%)	4,119 (9%)	42 (3%)	1,759 (12%)	449 (6%)	1,869 (8%)
Manufacturing	2,057,587 (11%)	2,530 (5%)	9 (1%)	673 (5%)	275 (4%)	1,573 (7%)
Retail trade	3,006,849 (16%)	8,491 (18%)	105 (8%)	2,540 (17%)	1,041 (14%)	4,805 (20%)
Services	6,759,116 (35%)	16,053 (34%)	927 (70%)	4,454 (30%)	3,215 (43%)	7,457 (32%)
Government	2,536,947 (13%)	8,635 (18%)	176 (13%)	2,398 (16%)	1,660 (22%)	4,401 (19%)
Other ¹	3,934,722 (20%)	7,181 (15%)	63 (5%)	2,877 (20%)	851 (11%)	20,105 (15%)
Total	19,326,016	47,009	1,322	14,701	7,491	23,495

Source: U.S. Bureau of Economic Analysis, 2002.

Table 3-36 Travel Impacts for California and Emigrant Counties, 2001

	California	Emigrant Region	Alpine County	Calaveras County	Mariposa County	Tuolumne County
Destination Spending ² (\$ Million)	65,267	728.0	34.8	195.9	277.5	219.9
Earnings (\$ Million)	24,760	232.4	11.3	60.7	91.6	68.8
Employment in 2000 ³ (jobs)	1,017,650	13,540	630	4,550	3,240	5,140
Employment in 2000 (% of total jobs)	5.2%	28%	47.7%	29.9%	41.7%	21.5%
Local Tax Receipts ⁴ (\$ Million)	1,681	14.3	.7	2.0	8.6	3.0
State Tax Receipts (\$ Million)	3,034	29.3	1.3	8.5	9.8	9.7

Source: Dean Runyan Associates, 2003.

Estimates of economic activity generated from travel related spending for California and the four individual counties is provided in Table 3-36. In 2002, visitors spent an estimated 32,947⁵ days (includes both overnight and day use) in the Emigrant Wilderness. Based on a review of the literature, Loomis and Richardson (2000) suggest that the average expenditure per person per day of primitive, roadless, and designated Wilderness recreation is about \$30. Based on these figures a rough estimate of the direct contribution to local Emigrant region economic activity from Emigrant Wilderness visitors in 2002 would be around \$988,410. If we assume that total use in the Emigrant is dispersed similarly to overnight use

¹ Includes Agricultural Services, Forestry, Fishing & Other; Mining; Transportation, Public Utilities and Communications; Wholesale Trade; and Financial Services, Insurance and Real Estate.

² Destination Spending does not include air transportation or travel arrangement.

³ Employment includes all full- and part-time payroll employees and working proprietors.

⁴ Property taxes are not included.

⁵ 33,947 days is derived from 65,894 RVDs.

(Emigrant Wilderness Management Plan, 1998, pp. 160-161) roughly 31% of this amount or \$306,407 may be generated by visitors to the dam/lake areas of the Emigrant. This would be about 0.04% of the estimated \$728 million in travel related expenditures occurring in the four county region in 2001.

3.10.1.3. SOCIO-ECONOMIC CHARACTERISTICS

Table 3-37 provides a summary of selected socio-economic characteristics of the Emigrant area counties in comparison to California and the United States as a whole. This table reveals that in general, the Emigrant counties are racially less diverse than the nation and the state of California. Alpine county, however, does have a large American Indian population (22.9% of its residents). All of the counties have a higher median age than the state of California or the nation, and all except Alpine have a higher percentage of retirement aged residents. With the exception of Alpine, each of the counties has a smaller percentage of residents with at least 4-year college degrees, compared to the nation and state. Unemployment rates were highest in Mariposa (8.2%) and Alpine (5.6%) counties. Each of the counties except Alpine county had a larger percentage of residents not in the labor force compared to the state and nation. Median household income was lower in all the counties compared to the state and nation, with the lowest occurring in Mariposa County (72% of the state level). Per capita income was also lowest in Mariposa County, followed by Tuolumne and Calaveras, which were below the state and U.S. level. Per capita income was higher in Alpine County than in the state or nation. The percent of individuals in poverty was higher in Alpine and Mariposa counties than in the state and nation, while Tuolumne and Calaveras counties had poverty rates below the national and state rates.

Table 3-37 Socio-Economic Characteristics, 2000

	U.S.	California	Alpine County	Calaveras County	Mariposa County	Tuolumne County
Race (% White)	75%	60%	74%	91%	89%	89%
Sex (% Female)	51%	50%	47%	50%	49%	47%
Median Age	35.3	33.3	39.3	44.6	42.9	42.9
Retirement (% over 65)	12.4%	10.6%	9.9%	18.2%	17.2%	18.5%
Education (% with a B.A. or higher)	24.4%	26.6%	28.2%	17.1%	20.2%	16.1%
Unemployment Rate	3.7%	4.3%	5.6%	4.2%	8.2%	3.8%
% Not in the Labor Force	36.1%	37.6%	30.6%	46%	42.3%	50.6%
Median Household Income	\$41,994	\$47,963	\$41,875	\$41,022	\$34,626	\$38,725
Per capita Income	\$21,875	\$22,711	\$24,431	\$21,420	\$18,190	\$21,015
% of Individuals in poverty	12.4%	14.2%	19.5%	11.8%	14.8%	11.4%

Source: U.S. Census Bureau 2002.

3.10.2 Local Social, Cultural, and Recreational Values

As discussed above, many residents from the four local counties recreate in the Emigrant. While local hikers and backpackers account for a larger percentage of the total number of visitors, local users account for almost a quarter of the private stock (horse packing) visitors to the wilderness. "Pack trips into the Emigrant basin for recreation, particularly fishing and hunting have long been a tradition for local and regional families and social groups. ...Local equestrian families in particular tend to make annual outings often to a place revisited year after year" (Emigrant Wilderness Management Plan, 1998, p.192). As stated in the Recreation section of this document:

"The history and folklore associated with the system of dams built by Fred Leighton and others is very much a part of local tradition . . . Local residents have a variety of beliefs concerning the dams, their construction, importance to the fisheries and grazing, and the contribution made to the watershed. . . . they (the dams) are a serious part of community relationship to the Emigrant Wilderness and the experience enjoyed by residents especially those for whom it is a multigenerational event."

"Sense of place" or place attachment is becoming an important concept in resource management, as decision makers and managers increasingly recognize the need to broaden their focus from the tangible or objective properties of the natural environment to also include the subjective, emotional and symbolic meanings associated with natural places and the personal bonds or attachments people form with specific places or landscapes (Williams and Stewart 1998). Two dimensions of place attachment have been identified (1) place dependence and (2) place identity. Williams and Vaske (2002) describe these as follows: (pp.5-6)¹

Place dependence (a functional attachment) reflects the importance of a place in providing features and conditions that support specific goals or desired activities, such as fishing or rock climbing. This functional attachment is embodied in the area's physical characteristics and may increase when the place is close enough to allow for frequent visitation. Place dependence thus suggests an on-going relationship with a particular setting.

Place identity (an emotional attachment) refers to the symbolic importance of a place as a repository for emotions and relationships that give meaning and purpose to life. Place identity has been described as a component of self-identity that enhances self-esteem, increases feelings of belonging to one's community, and is an important component of communications about environmental values and policies. Some investigators have suggested that a history of repeat visitation due to place dependence may lead to place identity (Moore and Graefe 1994). However, place identity is not necessarily a direct result of any particular experience with the place (though it generally involves a psychological investment with the place that tends to develop over time).

Both dimensions of place attachment to the Emigrant Wilderness are likely to exist for at least some local residents as discussed in Visuals (Section 3.3). Some locals are likely to have functional attachments to some of the dam/lake areas because of the fishing, camping, and hunting opportunities they enjoy in these areas on a recurring basis. Others have emotional attachments to the dams because they had either relatives or friends who helped

¹ For the specific sources these authors used to derive these general descriptions please see the referenced paper.

to build or maintain them, or because the dams are symbolic of the historic efforts of community members to provide benefits for their own and future generations of local residents.

Beckley (2003) discusses the difference between sociocultural and ecological magnets in attachment to place. Sociocultural magnets include kinship ties, social networks, institutional affiliations, historical architecture, and other human-caused landscape attributes, while ecological magnets may include mountains, old-growth forests, natural recreation sites, or other desirable landscape or ecological attributes. The dams are likely to be strong sociocultural magnets in place attachment to the Emigrant for some local residents. On the other hand, the many outstanding ecological features of the Emigrant Wilderness may act as strong ecological magnets in place identity (emotional or symbolic) attachment by local and nonlocal wilderness advocates.

3.10.3 General Wilderness Values¹

Wilderness areas are part of the natural capital of a region or landscape (Morton, 1999). Natural capital is an asset composed of objectively measurable attributes (such as flora, fauna, and geographic features) that fit and operate together to provide major functions (such as chemical cycling). The major functions of natural capital provide asset services to people and all other living organisms such as oxygen to breath and water to drink.

Natural capital services provide individuals and society with a broad array of values or benefits. As a specialized form of natural capital, the attributes and functions of designated wilderness areas as defined by The Wilderness Act provide a unique set of services illustrated in Table 3-38. These designated wilderness services support a unique set of values or benefits that can be organized into the four accounts or categories; social, economic, ecologic, and ethical.

As illustrated in Table 3.37, each of the four major value accounts has a number of subaccounts reflecting specific types of value measures or indicators. Under the social account, subaccounts include psychological values, sociological values, and anthropological values. Under the economic account, sub-accounts include active use values, passive use values, and economic impacts. Ecologic sub-accounts include human life support indicators and animal and plant life support indicators, and ethical subaccounts include instrumental values and intrinsic values. The wilderness value accounts and subaccounts are not necessarily mutually exclusive as more than one discipline may have a perspective on how to assess a particular type of wilderness value. For example, consider the concept of existence value. Existence value for, say, an endangered bird may be broadly defined as the value of its continued existence beyond active use by people. The existence value of the bird, as defined broadly here, could be assessed under each of the four major value accounts.


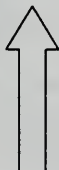

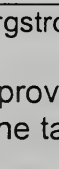
Under the social account, the bird's continued existence may provide specific psychological or sociological values to particular individuals or cultures that cannot be quantified in monetary terms. Under the economic account, existence value of the bird is a specific type of passive use value and would be defined as the economic value (e.g., willingness-to-pay) that an individual places on continued existence of the bird beyond economic values associated with active use in the present or future (e.g., present or future bird-watching

¹ Most of this section (including Table 3-36), except where noted, is drawn almost directly from Bergstrom, et al., 2002.

activities). Under the ecologic account, continued existence of the bird may be an important indicator of overall ecosystem health and biodiversity needed to support both human and nonhuman life. Under the ethical account, continued existence of the bird would have both instrumental and intrinsic values. An example of an instrumental value is the value of the bird as an input into generating happiness in a person who enjoys viewing the bird in the field or in pictures. Instrumental values obviously overlap with Social and Economic values. Intrinsic values of the bird include values of the bird beyond human active or passive use. That is, philosophically, the intrinsic value of the bird is the value that exists even in the absence of people.

Table 3-38 provides an organizing framework for wilderness values that recognizes the functional linkages and connections between wilderness attributes, functions, services, and values. Wilderness attributes support wilderness functions, wilderness functions support wilderness services, and wilderness services support wilderness values in a holistic manner. Thus, it is difficult if not impossible, to separate the contributions of wilderness attributes, functions, and services to specific types of wilderness values such as existence value. Similarly, each specific type of wilderness value can be viewed from social, economic, ecologic, or ethical perspectives. Some values, such as existence value cut across all value accounts or perspectives as discussed above. Other values may be limited to subsets of the four major value accounts.

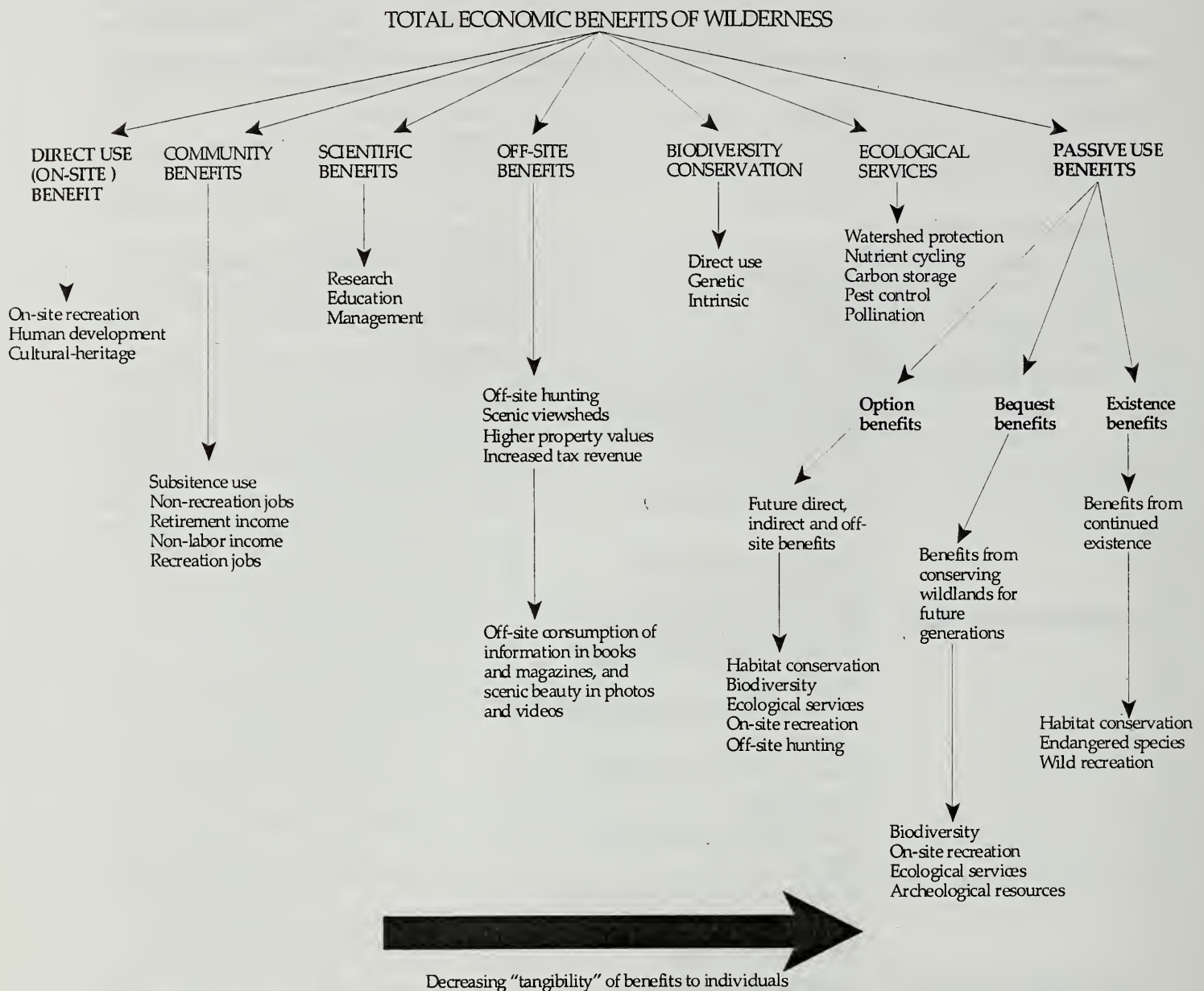
Table 3-38 An Organizing Framework for Wilderness Values

Basic Functional Connections	Measurement Accounts or Categories	Specific Types of Measures or Indicators
Wilderness Values 	Social	Psychological Value Social Value Anthropological Value
	Economic	Active Use Passive Use Economic Impacts
	Ecological	Human Life Support Value Animal and Plant Life Support
	Ethical	Instrumental Value Intrinsic Value
Wilderness Services 	Animal and Plant Habitat	
	Carbon Sequestration	
	Subsistence Living	
	Cultural Preservation	
	Historic Preservation	
	Scientific Discovery	
	Educational Development	
	Personal Physical Health and Growth	
	Personal Emotional Health and Growth	
	Personal Spiritual Health and Growth	
Wilderness Functions 	Preservation of Natural and Wild Places	
	Recreational and Experiential Setting	
	Ecosystem and Biodiversity Preserve	
Wilderness Attributes 	Geographic	
	Geologic	
	Hydrologic	
	Atmospheric	
	Biological	
	Naturalness	
	Wildness	
	Constructed	

Source: Bergstrom, et al., 2002.

Figure 3-2 provides a more detailed breakdown of the economic values of wilderness and illustrates the tangibility of these various values.

Figure 3-2 Summary of Economic Values of Wilderness.



Source: Adapted from Morton 1999

Loomis and Richardson (2000) describe the following eight categories of economic benefits from wilderness (pp.1-2):

- **Recreation use benefits.** These include on-site non-motorized recreation such as hiking, backpacking, horse packing, camping, hunting, fishing, canoeing, rafting, and commercially guided recreation trips.
- **Community benefits.** Included are direct and indirect jobs supported by non-motorized recreation and natural environments as a draw for job-creating entrepreneurs and for retirees who bring their incomes into the community.
- **Passive use benefits.** These include three kinds of values: (1) option values obtained from being able to visit natural areas in the future, (2) existence values obtained from simply knowing that natural areas exists, and (3) bequest values obtained from knowing that preservation today will ensure natural environments for future generations.

- **Scientific benefits.** Scientists recognize the value of wilderness as a benchmark or control for evaluating the impacts of development elsewhere and as a living laboratory to increase knowledge of natural forces.
- **Off-site benefits.** These include the value of fish and wildlife that are harvested outside of wilderness areas but that depend on wilderness areas for a portion of their habitat needs. Other off-site benefits are the scenic vistas provided by natural environments and enhanced values of property near such environments.
- **Biodiversity conservation.** The preservation of genetic, species, and ecosystem diversity.
- **Ecological services.** These include provision of high-quality water and nutrient cycling as well as carbon storage, which helps combat global climate change.
- **Education benefits.** Natural environments provide a living laboratory for many high school and college courses. In addition, designated Wilderness areas are used to teach teenagers and adults self-reliance, teamwork, and coping skills that they can transfer to everyday life.

The 1995 National Survey on Recreation and Environment (NSRE) included a 13-item wilderness value scale (WVS) that covered a range of on-site and off-site wilderness values (Haas et. al., 1986). Table 3-39 is adapted from Cordell, et al., (1998) who provided a summary of the U.S. public's ratings of these 13 values based on an analysis of responses to the survey. The table lists the percentage of respondents indicating "Very or Extremely Important" and of respondents indicating "Not Important" to 13 Wilderness Values. The table includes the mean score and standard error for each value.

Table 3-39 Response to 13 Wilderness Values

Wilderness Value	Very or Extremely Important (% of Respondents)	Not Important (% of Respondents)	Mean score	Standard Error
Protecting water quality	78.9	1.7	1.77	1.94
Protection of wildlife habitat	78.6	2.6	1.81	1.98
Protecting air quality	78.0	2.6	1.79	2.03
For future generations	76.9	2.0	1.84	1.96
Protection for endangered species	73.7	4.9	1.92	2.23
Preserving ecosystems	66.5	7.0	2.14	2.34
Scenic beauty	59.7	5.4	2.18	2.19
Future option to visit	59.4	7.7	2.24	2.37
Just knowing it exists	56.1	6.4	2.23	2.26
For scientific study	46.3	14.1	2.55	2.40
Recreation opportunities	48.9	10.1	2.46	2.22
Providing spiritual inspiration	43.2	18.3	2.62	2.65
Income for tourism industry	22.8	41.1	3.33	2.77

3.10.4. Social and Economic Effects

The potential direct, indirect, and cumulative Social and Economic effects associated with repairing, maintaining, and operating some dams and allowing some dams to naturally deteriorate over time extend beyond the immediate area of the dams. For the purposes of

analyzing local economic and social effects, the area used for the analysis is the four-county local region of Tuolumne, Calaveras, Alpine, and Mariposa counties. The analysis area used for assessing the potential effects on wilderness values held by the public at large is the nation.

RESPONSE TO ISSUES

The economic effects analysis addresses the concern that the loss of any of the dams would negatively influence the local recreation-based economy. If the dams are not present, there may be fewer visitors entering the wilderness because there may be less water in the lakes. Less water in the lakes could mean less fish for anglers.

The social effects analysis addresses the concern that not repairing, maintaining, and operating all of the dams may detrimentally affect the local social values and activities associated with the wilderness area. There is an extensive history of local individuals and organizations taking an active role in maintaining and operating the dams. If the dams did not exist, this activity would be unnecessary and the social history associated with the dams would be lost.

3.10.4.1. EFFECTS ON LOCAL ECONOMIC ACTIVITY

It is not possible to predict accurately exactly how visitation to the dam/lake areas would change in response to repairing, maintaining, and operating dams or to allowing them to deteriorate naturally. Therefore, it is also impossible to predict accurately changes in local economic activity associated with changes in visitation. However, we can get a sense of the range of effects if we assume worst-case scenarios for visitation. For example, we can assume if the deterioration of a dam is likely to cause a decrease in fishing opportunities in that area (due to either decreased lake or stream fisheries), then visitation to that area would fall to zero, and these visitors would not go to other areas within the local region. Based on these assumptions, along with the rough estimate of the 2002 contribution of Emigrant Wilderness visitors to local economic activity (\$988,410 – presented in the Section 3.10.1.2), the estimates of visitation to the dam/lake areas (Emigrant Wilderness Management Plan, 1998, pp.160-161), and the most likely effects on fisheries (Fisheries, Section 3.8), the worst-case effects for each alternative are displayed in Table 3-40.¹

Table 3-40 Changes in Visitation and Economic Activity (Worst Case)

	Alternative 1 (Proposed Action)	Alternative 2 (No Action)	Alternative 3 (Heritage)
Areas with likely decrease in lake or stream fisheries	Bear, Red Can, Yellowhammer, and Horse Meadow	All except Cow, Cooper, and Whitesides meadows	Y-Meadow, High Emigrant, Middle Emigrant, Snow, Huckleberry, Bear, Yellowhammer, and Horse Meadow
Percent change in visitation	-4.95%	-27%	-11.68%
Change in local economic activity	-\$48,926	-\$266,870	-\$115,446

¹ This also assumes that visitation to the lakes ceases immediately, rather than slowly overtime as the dams gradually deteriorate.

Obviously, it is unlikely these worst-case scenarios would hold because many people visit these areas for reasons other than fishing. Additionally, it is unlikely all anglers would totally avoid an area if some fishing opportunity still existed. Further, it is likely at least some anglers would respond to the decreased fishing opportunities by going to other locations within the local region either inside or outside the Emigrant Wilderness, and thus they would still be contributing to local economic activity. Finally, as stated in Fisheries (Section 3.8), CDFG may mitigate potential decreases in fishing opportunities at some dam/lake areas through stocking. Table 3-40 shows that Alternative 2 has the largest potential to affect local economic activity. However, within the context of the total estimated travel-related spending, \$728 million in 2001 for the local region, it is difficult to say the effect on the local economy would be significant for any of the alternatives.

3.10.4.2. SOCIAL, CULTURAL, AND RECREATIONAL VALUES

Based on the Fisheries analysis in Section 3.8, in the long term, Alternative 2, in which all the dams would be allowed to deteriorate, has the largest potential to reduce recreational values associated with fishing opportunities at the dam/lake areas. Alternative 3 has the next highest potential to reduce recreational fishing values, while Alternative 1 would likely result in the least impact to recreational fishing values. (Short-term impacts to recreational fishing values would occur during the reconstruction, repair, and maintenance of the dams under Alternatives 1 and 3).

For recreational visitors who do not fish, recreation values would likely be reduced most in the short-term under Alternative 1 due to increased activity at the dam/lake areas during the periods of dam reconstruction, repair, and maintenance. For recreational users whose values are closely tied to the scenic integrity of the dam/lake areas they visit, Alternative 2, in which all of the dams are allowed to deteriorate naturally, has the largest potential to increase scenic integrity in the long term.

As discussed in Section 3.10.2, as well as in the Recreation and Heritage sections, some local residents have very strong place attachments to the dam/lake areas in the Emigrant. For these people the social, historical, and cultural values associated with either visiting the dams or just knowing they exist would be reduced most under Alternative 2 since none of the dams would be repaired or maintained. Alternative 1 would maintain, and possibly increase, these social and cultural values as local volunteers take part in repairing and maintaining the dams. Beckley (2003) suggests that in some cases, social relations deepen and meaning in a place is created simultaneously through interaction with other people and with the place itself, and in such cases it may be difficult to disaggregate attachments to the people, the place, or even the collective action and the social capital that flows from voluntary, cooperative ventures.

3.10.4.3. GENERAL WILDERNESS VALUES

As outlined previously, the public holds many different types of values with respect to Wilderness areas. This section provides a qualitative examination of the relative rankings of the three alternatives for some of these values (as listed in Table 3-39, Cordell et al., 1998) based on the effects analysis from other sections (Recreation, Visual Resources, Fisheries, Wildlife, and Watershed).

Effects on recreational values for the public at large would generally be the same as those discussed above for local recreational users of the area. In other words, Alternative 1 would

be best for anglers, followed by Alternative 3 and Alternative 2. For those recreational users who do not fish, Alternative 2 would probably be best since there would be no short-term adverse effects associated with repairing or maintaining the dams. In the long term, scenic beauty would be highest under Alternative 2, followed by Alternative 3 and Alternative 1.

The restoration of hydrological function, sediment transport processes, hydrological connectivity, and the potential for riparian and meadow restoration, would be highest under Alternative 2, followed by Alternative 3, then Alternative 1 (see Watershed, Section 3.1). These effects are related to natural processes and the value of preserving ecosystems.

Because of the increased potential for meadow habitat and the potential decreases in predation on the mountain yellow-legged frog (MYLF) due to potentially decreased fisheries, Alternative 2 also rates highest in terms of the protection of wildlife habitat and protection of potentially endangered species. Alternative 3 ranks second in terms of these values, and although Alternative 1 ranks lowest, it could benefit both the Yosemite toad and the MYLF in the Horse Meadow area (Wildlife, Section 3.7).

In terms of potential effects on income for the tourism industry, Alternative 2 could have the greatest adverse effects, followed by Alternative 3 and then Alternative 1. This wilderness value had both the lowest percentage of respondents who felt it was very or extremely important (22.1%) and the highest percentage of respondents who felt it was not important (41.1%) (Cordell, et al., 1998).

3.10.5. Environmental Justice

Concerns over the issues of environmental protection, democracy, and social justice led to the enactment of Executive Order 12898 that formalized the notion of environmental justice. This order requires federal agencies to analyze the environmental effects, including human health, economic, and social effects of their actions on minority and low-income communities, addressing instances where the effects on these communities may be disproportionately high and adverse.

Except for the American Indian population in Alpine county, there are smaller percentages of ethnic minority populations in the four-county local region than exist in the nation at large. None of the alternatives considered would result in disproportionately high or adverse effects on the American Indian community in Alpine county. Additionally, there are no predicted disproportionately high or adverse effects on low-income communities associated with any of the alternatives.

3.11. ADMINISTRATIVE COSTS

As stated in Section 2.3, the implementation of the Proposed Action (or Alternative 3) would be dependent upon the use of non-appropriated funding. Implementation would be completed with volunteers, partnerships, memorandum of agreements, etc., including materials, stock support, and labor.

In addition to the implementation costs, it is estimated that some cost to government would occur for coordination, mitigation, and monitoring of project activities. Because each dam is different, requiring varying degrees of actions, the following assumptions have been developed:

- One project per year would be completed. A project is the repair and maintenance of one dam structure.
- The project would be completed in one field season.
- The project area would be accessible with one day's travel.
- The dam being repaired and maintained is eligible for the National Register of Historic Places.
- One employee would be needed to coordinate with non-Forest Service project leader. This employee would need to:
 - Review and agree to specific actions and timelines.
 - Coordinate with the Heritage Resource specialist on material requirements and construction methods for the eligible structure.
 - Visit the project area to designate an access route, a materials storage area, campsite location, etc.

The following costs have been estimated:

- Site Visit #1 – 3 days @ GS-9 = \$700.00 (two days travel, one day on site)
- Site Visit #2 – 3 days @ GS-9 = \$700.00 (two days travel, one day on site)
- Administrative, 1 day @ GS-9 = \$237.00
- Heritage Resource Specialist, ½ day @ GS-9 = \$118.00

The total estimated cost, for each dam, would be \$2,755¹.

There is also a cost to maintain the administrative records, complete on-site inspections², and write reports. This cost is estimated to be \$5,000 annually. Since all the dams would continue to be inspected until they no longer impounded water, (regardless of whether they are maintained or not maintained) there would be no noticeable change between the alternatives. Although a few of the dams would stop functioning in less than 10 years, the majority may continue impounding water for 25-50 years (up to 100 years for Y-Meadow).

3.11.1. ALTERNATIVE 1 – PROPOSED ACTION

With an estimate of \$2,755 for each dam, the Proposed Action's administrative cost to the Forest Service would be approximately \$33,060.

3.11.2. ALTERNATIVE 2 – NO ACTION

Alternative 2 would require little if any appropriated funding. Due to the small size of the impoundment structures, deterioration over time would likely result in significant leaking which would alleviate the potential of a major breach failure. In the unlikely event of a potential failure that could affect public safety, the Forest Service could initiate an action to drain or breach the structure to reduce impoundment pressure. The cost of this activity is unknown.

¹ This amount is an average, as costs could be higher or lower for any given project depending on the complexity of the project and the location of the site.

² Every 3-5 years depending on the dam's administrative classification and hazard rating (Wisehart 2003).

3.11.3. ALTERNATIVE 3 – HERITAGE

This alternative proposes to repair and maintain the seven dams that are eligible for inclusion on the National Register of Historic Places. Based on the assumptions above, and the estimated cost of \$2,755/dam, this alternative would cost the Forest Service approximately \$19,285.

3.11.4. Summary

	Alternative 1 Proposed Action	Alternative 2 No Action	Alternative 3 Heritage
Estimated Administrative Cost to Implement the Alternative	\$33,060	\$0	\$19,285

3.12. SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

3.13. UNAVOIDABLE ADVERSE EFFECTS

As described in Chapter 3, there are no unavoidable adverse effects.

3.14. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forest areas that are kept clear for use as a power line rights-of-way or road.

There would be an irretrievable loss of 18 acres of existing meadow habitat at Cow Meadow dam in Alternative 1. In this alternative, the dam would be reconstructed.

The long-term effect of non-maintenance and natural deterioration of the seven NRHP eligible dams would be the irreversible loss of representative examples of Fred Leighton’s contributions to early fisheries improvements.

The original meadow habitat that was inundated by Y-Meadow dam is irreversibly lost due to sediment deposits in the lakebed.

3.15. OTHER REQUIRED DISCLOSURES

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ... other environmental review laws and executive orders."

The Forest Service is following the requirements of National Historic Preservation Act for ground-disturbing actions with the State Historic Preservation Officer.

Consultation with U.S. Fish and Wildlife Service in accordance with the Endangered Species Act implementing regulations for projects with threatened or endangers species is ongoing. The bald eagle is the only species requiring informal consultation.

Executive Order 12898 – Environmental Justice. See 3.10.5.

Chapter 4 – Consultation and Coordination

4.1. PREPARERS AND CONTRIBUTORS

The Forest Service consulted the following individuals, federal, state, and local agencies and non-Forest persons during the development of this environmental assessment:

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Core Team			
Name	Contribution	Degree(s)	Years of Experience
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Lisa Crone	Social and Economic	BA, Economics PhD, Economics	11
Anne Davy	Team Leader	BS, Forest Management BS, Forest Administration MBA	18
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Pam Conners	Heritage Resources	MS, History/Public History	25
Robert Wetzel	Wilderness	BS, Forest Management	28

4.1.2. Federal, State, and Local Agencies

California Department of Fish and Game

4.1.3. Tribes

Tuolumne Me-Wuk Tribal Council

Chapter 5 – Agencies, Organizations, and Persons who Received a Copy of the Statement

As part of CEQ Regulations on the National Environmental Policy Act, the Forest Service is circulating either the Draft EIS or a notice of the availability of the Draft EIS to the following agencies, organizations, and individuals.

Those receiving the Draft EIS have 45 days to comment on the EIS. Their comments should be as substantive as possible. According to CEQ Regulations (§1503.4), the Forest Service must respond in writing to every comment, even if such a response necessitates substantial changes to the EIS, such as the addition or deletion of alternatives or the analysis of new resource issues. The Forest Service will publish its responses along with the revised Final EIS.

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- USDA National Agricultural Library
- U.S. Army Corps of Engineers, S. Pacific Division
- U.S. Environmental Protection Agency
- U.S. Dept. of Housing and Urban Development
- USDI Office of Envir. Policy and Compliance
- U.S. Coast Guard, Environmental Impact Branch
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- USDA Natural Resources Conservation Service
- Bureau of Land Management, CA State Office
- U.S. Dept. of Energy, Office of Envir. Compliance
- Region IX Environmental Protection Agency
- HUD Field Environmental Officer, CA State Office
- National Park Service, Pacific West Region
- Federal Aviation Admin., Western-Pacific Region

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Appendix A – FS/CDFG Joint Strategy

File Code: 2600

Date: November 8, 2000

Mr. Robert Hight, Director
California Department of Fish & Game
1416 Ninth Street
Sacramento, CA 95814

Dear Mr. Hight,

Representatives from California Department of Fish and Game (the Department) and the USDA Forest Service (USFS) met on December 5, 1999 to discuss issues and concerns related to the future management of water impoundment structures within the Emigrant Wilderness on the Stanislaus National Forest. Following direction contained in the joint Memorandum of Understanding, the Department and USFS agreed to work toward collaborative solutions to meet the needs and concerns of both agencies. The proposed strategy for management of each water impoundment structure is presented in the following table and discussion.

Watershed/Structure	Type	Management Strategy
Upper South Fork Stanislaus River Watershed		
Cooper Meadow	Meadow maintenance	No maintenance
Whitesides Meadow	Meadow maintenance	No maintenance
Lily Creek Watershed		
Y-Meadow Lake	Stream-flow maintenance	No maintenance \3
Bear Lake	Stream-flow maintenance	No maintenance
West Fork Cherry Creek Watershed		
Long Lake	Stream-flow maintenance	Maintain
Lower Buck Lake	Stream-flow maintenance	Maintain
Middle Cherry Creek Watershed		
Red Can Lake	Lake level	No maintenance
Leighton Lake	Stream-flow maintenance	Maintain
Yellowhammer Lake	Lake level	No maintenance
North Fork Cherry Creek Watershed \ 1		
High Emigrant Lake	Stream-flow maintenance	No maintenance
Emigrant Meadow Lake	Stream-flow maintenance	Maintain
Middle Emigrant Lake	Stream-flow maintenance	Maintain
Emigrant Lake	Stream-flow maintenance	Maintain
Cow Meadow Lake	Lake level	No maintenance

Watershed/Structure	Type	Management Strategy
East Fork Cherry Creek Watershed		
Snow Lake	Stream-flow maintenance	No maintenance \2
Horse Meadow	Meadow maintenance	No maintenance
Bigelow Lake	Stream-flow maintenance	Maintain
Huckleberry Lake	Stream-flow maintenance	Maintain

1. The USFS and the Department will further evaluate potential impacts to aquatic and riparian species including Yosemite toad, other amphibian species, and fisheries. Both agencies will review new data and work cooperatively to determine if adjustments to the proposed management strategy are needed for High Emigrant Lake and Cow Meadow Lake.

2. Monitor effects of no maintenance on lake level and downstream fisheries. The Department will investigate whether stream-flow release is necessary to maintain the existing fast-action brook trout fishery downstream. The USFS and the Department will review new data and work cooperatively to determine if adjustments to the proposed management strategy are needed for Snow Lake.

3. The Department and USFS will work together to monitor populations of fairy shrimp and mountain yellow-legged frogs to determine if adjustments to the proposed management strategy are needed for Y-Meadow Lake.

"Maintain" includes maintenance and operation of stream-flow release valves. Operation of valves for flushing flows in the early summer is needed to maintain intake and valve functions. Also, valves must be kept in operating condition to perform maintenance work on the water impoundment structures.

Criteria for operation of stream-flow release valves will be based on historic operations to the extent feasible and formulated jointly by the USFS and the Department based on considerations for each stream segment. Both agencies will provide appropriate specialists to develop operational guidelines for flow regulation. Annual operation may be implemented if it is determined to be necessary to maintain the fishery and/or other aquatic or riparian values or species in good condition. Both agencies favor naturally reproducing fisheries to reduce impacts on natural processes.

Vandalism is not considered part of the normal deterioration process that occurs when a dam is not maintained. The USFS will work cooperatively with interested parties to either rebuild portions of dams, which are destroyed due to vandalism, or remove unauthorized repairs on dams. The normal or natural deterioration process that will occur at "no maintenance" dams will allow the agencies time to review impacts to both the downstream and impounded areas and resources. To the extent feasible, within personnel and financial constraints, the USFS and the Department will monitor the effect of deterioration of all the dams.

Implementation of activities to maintain water impoundment structures will comply with USFS policies including NEPA and NFMA regulations.

We would like to thank you for the time and effort put forth by your staff to develop this water impoundment strategy cooperatively with the USFS. We look forward to working with the Department in the future.

Sincerely,

/s/Dave Allasia(for)
BRADLEY E. POWELL
Regional Forester

Role	Staff	Name	Date/Time
Author:	EC	Leigh McDougal	06/23/00, 3:34 pm
Concur:	EC	Karen Burmark	06/26/00, 2:00 pm
	EC	Laurie Fenwood	06/26/00, 4:25 pm
	RF	Dianne Morgado	06/28/2000 @ 1715
Revision:	EC	Leigh McDougal	10/23/2000 9:38 AM
	EC	Karen Burmark	11/02/2000 5:10 PM
	EC	Laurie Fenwood	11/03/2000 3:35 PM
	RF Office	Ann Spencer	11/08/00 08:20 am

Appendix B – National Register Criteria

National Register Criteria for Evaluation

For properties to be eligible for listing on the National Register of Historic Places, they must possess all seven aspects of Integrity and meet one of the four criteria listed below (36 CFR 60.4).

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in district, sites buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association, and;

- A. That are associated with events that have made a significant contribution to the broad patterns of our history; or
- B. That are associated with the lives of persons that are significant in our past; or
- C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D. That have yielded, or may be likely to yield, information important in prehistory or history.

Criteria A

If a dam is considered eligible under this criterion, it must clearly demonstrate that it has an association with events that have made a significant contribution to the broad patterns of our history at a national, state, regional, or local context.

The dams in the Emigrant Wilderness represent the efforts of one individual, Fred Leighton, the Forest Service, Tuolumne County, the State Commission of Fish and Game, and other agencies and organizations towards enhancing the fisheries throughout the central Sierra, and in particular those within the “Emigrant Basin Primitive Area” established in 1929 under Regulation L-20. Since the passage of Regulation L-20 and the 1964 Wilderness Act, the values and utilization of wilderness have changed. The singular efforts of Leighton and others to modify lakes and streamflows for fishery improvement may not meet today’s standards of wilderness use, yet the idea of lake level and streamflow maintenance dams resulted in a significant contribution to the development of outdoor recreation and fisheries habitat improvement within California.

Beginning in 1920 and concluding in 1931, Fred Leighton, Bill Burnham, and others constructed the “first phase” of lake level and streamflow maintenance dams. This included dams at Emigrant Lake, Yellowhammer Lake, Red Can Lake, Leighton Lake, Bigelow Lake, Long Lake, Emigrant Meadow Lake, and Lower Buck Lake.

Building on the success of the first phase of dams and after securing the continued support of State and local agencies, the second phase of dam construction began which utilized the workforce of the Civilian Conservation Corps (CCC). The dams constructed by the CCC include Bear Lake, Y-Meadow, Huckleberry Lake, Horse Meadow, Cow Meadow Dam,

Snow Lake, Cooper Meadow, and Whitesides Meadow. In 1951, Middle Emigrant and High Emigrant dams were constructed involving workforce of the Forest Service and California Department of Fish and Game. The second and later phase of dam construction, like other dams constructed throughout the central Sierra, mimic the idea and reflect the earlier work of Leighton, but are not directly associated with him and the first phase of dam construction in California.

Therefore, it was the determination of the Forest Service that the first phase of dams constructed under the guidance and sponsorship of Fred Leighton were significant in contributing to the later design and construction of streamflow maintenance dams throughout the central Sierra and California and were found to be eligible to the NRHP under Criteria A. They include the dams at Leighton Lake, Long Lake, Bigelow Lake, Emigrant Lake, Emigrant Meadow Lake, and Lower Buck Lake.

In 1998, the Forest Service also found the lake level dam at Red Can Lake eligible to the NRHP under Criteria A. Yellowhammer Lake dam though eligible under Criteria A, was found not to be eligible due to lack of Integrity.

Criteria B

Properties eligible under this criterion must demonstrate that they are associated with an individual or individuals significant in our past.

Based upon the contextual history, Fred Leighton, businessman, sportsman, and wilderness pioneer, played a significant role in conceptualizing and promoting the development of streamflow maintenance dams in the central Sierra and California. The Central Valley Chamber of Commerce and the State recognized Fred Leighton for his work on the development of these dams in the central Sierra and California. In addition, newspapers and magazines credited Leighton as the "father" or "pioneer" of streamflow maintenance dams (referred to as check dams in some articles) in California.

Therefore, it was the determination of the Forest Service that Fred Leighton's contributions to streamflow maintenance dams and fisheries improvements in California were significant. Leighton's efforts represent the first phase of streamflow maintenance dam construction in California. For that reason, dams at Leighton, Long, Bigelow, Emigrant, Emigrant Meadow, and Lower Buck lakes are eligible to the NRHP under Criteria B.

In 1998, the Forest Service found Red Can dam, a lake level dam, also to be eligible to the NRHP under Criteria B. Yellowhammer Lake Dam though eligible under Criteria B, was found to be not eligible due to lack of integrity.

Criteria C

Under this criterion, a dam must clearly demonstrate a distinctive architectural style, type, period, or method of construction, or represent the work of a recognized architect or craftsman. Individually, dams in the Emigrant Wilderness do not exhibit unique engineering features, nor do they demonstrate a distinctive architectural style. However, the dams do exhibit a utilitarian and cost-effective method of damming low volume lakes or streams. Each of the dams that were built involved specific engineering skills that were provided by local individuals, the State, or the Forest Service.

Therefore, none of the 18 dams has been determined eligible by the Forest Service to the NRHP under Criteria C.

Criteria D

For a dam to be eligible under this criterion, it must have the potential to convey scientific information important to its contextual history, or information important to the cultural environment in which it exists. The streamflow maintenance dams and their extant features do not possess important scientific information.

Therefore, none of the 18 dams has been determined eligible by the Forest Service to the NRHP under Criteria D.

Aspect of Integrity

For a dam to be considered significant, it must meet one or more of the four eligibility criteria and retain all aspects of integrity. Seven aspects define integrity: location, design, setting, materials, workmanship, feeling, and association. The previous section demonstrated that of the 18 dams listed, Leighton, Long, Bigelow, Emigrant Meadow, Emigrant, Lower Buck and Red Can meet Criteria A and B of the NRHP. The following discussion of integrity will address only these seven dams.

Location

Location is the place where the historic property was constructed or the place where an event occurred. The location of the seven dams is also important to the understanding of why the dam was created. When the dams were first constructed, the area had not yet been designated a wilderness, but was managed under Regulation L-20 as a Primitive Area. The wild beauty of the area influenced Leighton and the Forest Service to construct dams with materials that blended with the natural setting. The obvious choice, and because of minimal cost, was locally obtained granite, earth, and sod. Since the dams were constructed, none has been moved. Thus, all seven retain "Integrity of Location."

Design

Design was an important consideration in dam construction. The issue of design was debated among members of several fact-finding parties. The final decision was to build the dams at as low a cost as possible, using local materials. Each dam required a certain degree of engineering. Many of the rock rubble dams had to be truncated or stepped to carry the weight of the heavy granite boulders used in construction. Although all seven dams have received varying degrees of maintenance and repair over the years, they all retain their basic design. Additions and/or modifications were made to Long, Bigelow, and Emigrant Meadow dams, yet these structural improvements done in the 1930s through the 1950s were in keeping with the dam's original design. Therefore, all seven dams retain "Integrity of Design."

Setting

Setting is the physical environment of a historic property. Where "integrity of location" refers to a specific place, setting refers to the character of the place. The setting of the seven

dams within the Emigrant Primitive Basin influenced the builders design and choice of materials. Therefore, all seven dams retain "Integrity of Setting."

Materials

Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property. Dams built in wilderness settings throughout California relied upon native materials, including earth or sod, rock, clay, and sand for construction. Cement used for mortar, was carried in by horse or other pack animals. The dams in the Emigrant were built of rock and most were mortared rather than dry-laid, since mortar helped prevent leakage. Many, but not all, of the dams were gated to allow downstream flows through a headgate. All seven dams retain the same, if not the original materials, as when they were built. Therefore, all seven dams retain "Integrity of Materials."

Workmanship

Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory. Construction of the dams was generally carried out with four to five person crews. This was necessary for insuring the heavy rocks could be moved and blasting could be done safely and efficiently. Workmanship on the dams did not require everyone to be a skilled artisan or engineer; however, at least one of the crew, generally the foreman, was skilled in masonry or dam construction and worked from a set of general plans. Today, with minor modifications over the years, all seven retain the original workmanship. Therefore, all the dams retain "Integrity of Workmanship."

Feeling

Feeling is a property's expression of the aesthetic or historic sense of a particular period. The feeling generated by an historic property depends on other facets of integrity, including workmanship, materials, and setting. Dams that demonstrate a strong historic feeling are those that retain a high degree of integrity. Studies carried out within Wilderness Areas with dams suggest that they do not hinder or reduce the wilderness experience (Trussell n.d.). All seven dams maintain a strong feeling that exemplifies the remote, natural surrounding of the area; therefore, all the dams retain "Integrity of Feeling."

Association

Association is the direct link between an important historic event or person and a historic property. The seven dams convey an association with primitive, less refined methods of engineering and dam construction, and for many are recognized as physical monuments of one of Tuolumne County's most notable businessman and sportsman, Fred Leighton. The use of native rock rubble and local features, such as boulders to support each dam structure reflects the builders desire to erect a natural appearing structure and to build it at as low a cost as practical. Thus, all seven dams convey an association with an earlier period of engineering technology and with Fred Leighton, considered the pioneer of check dams in California.

Appendix C – Noxious Weed Risk Assessment

Introduction

Forest Service Manual 2081.03, the Sierra Nevada Forest Plan Amendment (SNFPA), and the Region 5 Noxious Weed Management Strategy require that a noxious weed risk assessment be conducted to “determine risks for weed spread ... associated with different types of proposed management activities [and] to develop mitigation measures for high and moderate risk activities” (SNFPA Record of Decision, Appendix A, page A-30).

Noxious weeds are defined in FSM 2080.5 as “those plant species designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage....”

This noxious weed risk assessment evaluates the risk for weed introduction and spread by the Project.

Factors Independent of the Proposed Action

Factors that are independent of the proposed action are the amounts and locations of weeds in the project area and surrounds, the suitability of the project area for weed establishment and growth, and the amount and types of vectors that could introduce or spread weeds that are not related to the project. Assumptions for this analysis are that areas with bare soil, high sunlight, and sufficient moisture are the areas most likely for weeds to establish.

Most of the area has not been inventoried for noxious weeds. Surveys and inventories are not planned as part of this project. Observations at Horse, Cooper, and Whitesides meadows and Emigrant, Middle Emigrant, Emigrant Meadow, High Emigrant, and Bigelow lakes in 2001 and 2002 showed an absence of state-listed noxious weeds. Dandelions (*Taraxacum officinale*), white clover (*Trifolium repens*), sheep sorrel (*Rumex acetosella*) and other non-native species are present.

The weeds most likely to occur based on elevation range and proximity to the project are (grouped by habitat): cheatgrass (*Bromus tectorum*), diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*C. maculosa*), tocalote (*C. melitensis*), yellow star-thistle (*C. solstitialis*), and Russian thistle (*Salsola tragus*) in dry habitats and whitetop (*Cardaria pubescens*), Canada thistle (*Cirsium arvense*), bull thistle (*C. vulgaris*), ox-eye daisy (*Leucanthemum vulgare*), and Russian olive (*Eleagnus angustifolius*) in meadows and wetter areas (based on elevations from Hickman 1994, Bossard *et al.* 2000, and personal observations). All of these except Russian thistle and Russian olive are known in or near the Stanislaus National Forest. Ox-eye daisy is abundant near the Aspen Pack station and is particularly likely to have been carried in to Bear Lake. Bear Lake is heavily used and is one of the closest wilderness lakes to the pack station. Ox-eye daisy can be picked and carried along trails by hikers. Cheatgrass was found spreading from the trail from Aspen Pack Station and occurs at Relief Reservoir. Other lower elevation lakes that are more likely to have weeds are Yellowhammer, Cow Meadow, and Huckleberry lakes. Leighton, Red Can, and Lower Buck

lake dams are slightly higher, but still lower than areas that have been surveyed. Bear Lake and Yellowhammer dams would not be maintained in any of the alternatives. Cow meadow and Huckleberry lakes would be maintained in the proposed action and Red Can would be maintained in Alternative 3. Leighton and Lower Buck would be maintained in both action alternatives. The lack of a full inventory increases the risk that weeds could be spread from one area to another within the project or expanded within one area. Since most work on this project will focus on one dam at a time, the visits for flow regulation are the primary activities that could carry weeds from one site to another.

Over half of the Emigrant Wilderness is barren rock (USDA Forest Service 1996). In some areas, the primary areas of connectivity are along the stream corridors. The openness and the availability of water could facilitate the establishment of weeds in the areas around the dams and their associated lakes and meadows. The high elevation reduces the numbers of weed species that could occur. Generally, weeds at higher elevations tend to be perennials. Due to the high elevation of the project area, weeds are only moderately likely to establish despite the openness and moisture.

Due to the wilderness location and its corresponding absence of roads, weed vectors are fewer than in many projects on the forest. The primary vectors of weeds are hikers and stock animals and their feed. There is one abandoned road that goes by High Emigrant Lake and Horse Meadow. Wind, water flow, and wildlife can also spread weeds. Surveys along some of the rivers on the forest have shown that weeds can travel miles downstream from their point of introduction (Spring Gap-Stanislaus FERC Relicensing and Pinecrest Fuelbreak projects). The presence of lakes in this project could interrupt that movement.

Project Dependent Factors

Factors related to the project include changes to the habitat that could increase susceptibility to weeds and the increase in vectors during and because of the project.

The project would create some temporary trails and would disturb soil primarily in the area right around the dams. Most of these would be routed toward hardened areas. These are likely to be relatively dry areas that would be less likely to support the establishment of weeds. There would be very little removal of plants that could shade the area except immediately adjacent to the dams. The disturbance would occur during single summer, generally late in the season when water level is lower. Near Leighton and Red Can dams, areas of meadow could be left bare where sod is harvested. The largest total area in one site would be 400 square feet at Leighton below the dam (R. Wisehart, electronic communication 7/03). Any temporary trails would be restored following the work.

Vectors would be increased temporarily over a short period. Most of the work could be accomplished by groups of up to 5 people and up to 14 pack animals over a period of one to three weeks with a separate trip in each week. Most of the lower elevation dams would only have 4 pack animals at a time (please see Wilderness section for more details). The materials and equipment used could introduce weed seed depending on where it had been used previously. There are few anticipated changes to the pattern of use because of this action.

Management Requirements/Mitigation and Monitoring

The following management requirements would reduce the likelihood of introducing new infestations of noxious weeds into the project area.

1. Certified weed free hay and feed would be used for all pack stock associated with this project.
2. Survey for weeds when establishing where the project workers would camp at each site or train at least one person working at the project site to recognize noxious weeds. Any weeds at the site would be avoided during the work or any equipment used at a weed-infested site will be cleaned before moving it to a weed-free site.
3. Equipment such as rock sleds and tools would be free of dirt and plant material that could introduce weed seed.

Overall Risk *With* Management Requirements

Implementing the management requirements listed above as part of the proposed action of the Emigrant Wilderness Dams Project reduces or eliminates the risks of introducing or spreading noxious weeds in the project area. Implementation of the proposed project with the noxious weed management requirements would impart a low risk of noxious weed introduction and spread by the project.

Overall Risk *Without* Management Requirements

Implementing the Emigrant Wilderness Dams Project *without* implementing the management requirements listed above would impart a moderate risk of introducing new infestations of noxious weeds, depending on whether or not there were noxious weeds present where the equipment had been used previously and on the feed used for the stock.

Although the risk is lower than in many other activities, the wilderness status and difficulty of treating and weeds that might establish in these remote locations are additional factors pointing to the use of management requirements to lower the risk.

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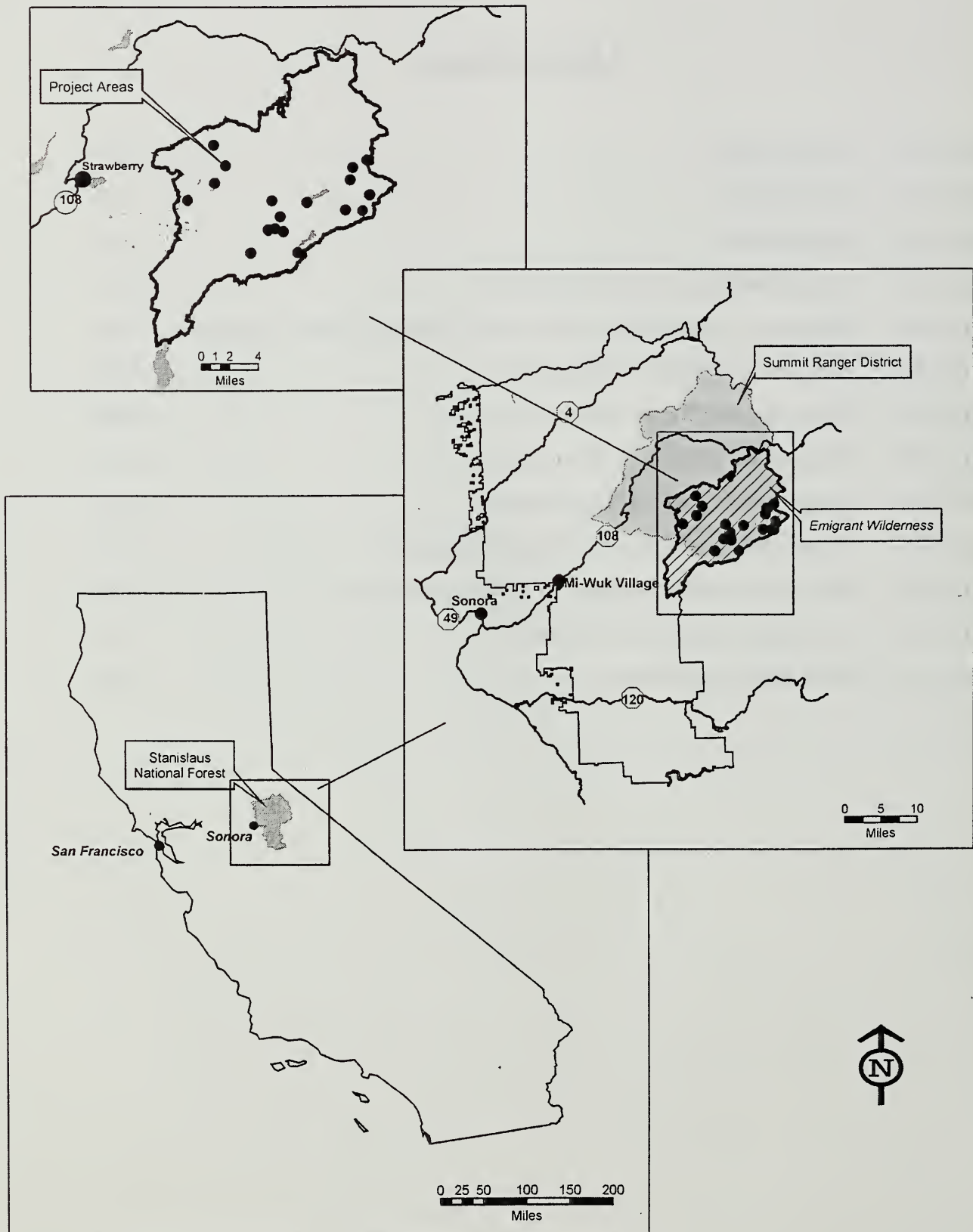
USDA Forest Service, 1996. Emigrant Wilderness Management Direction, Draft Environmental Impact Statement.

Appendix D – Maps

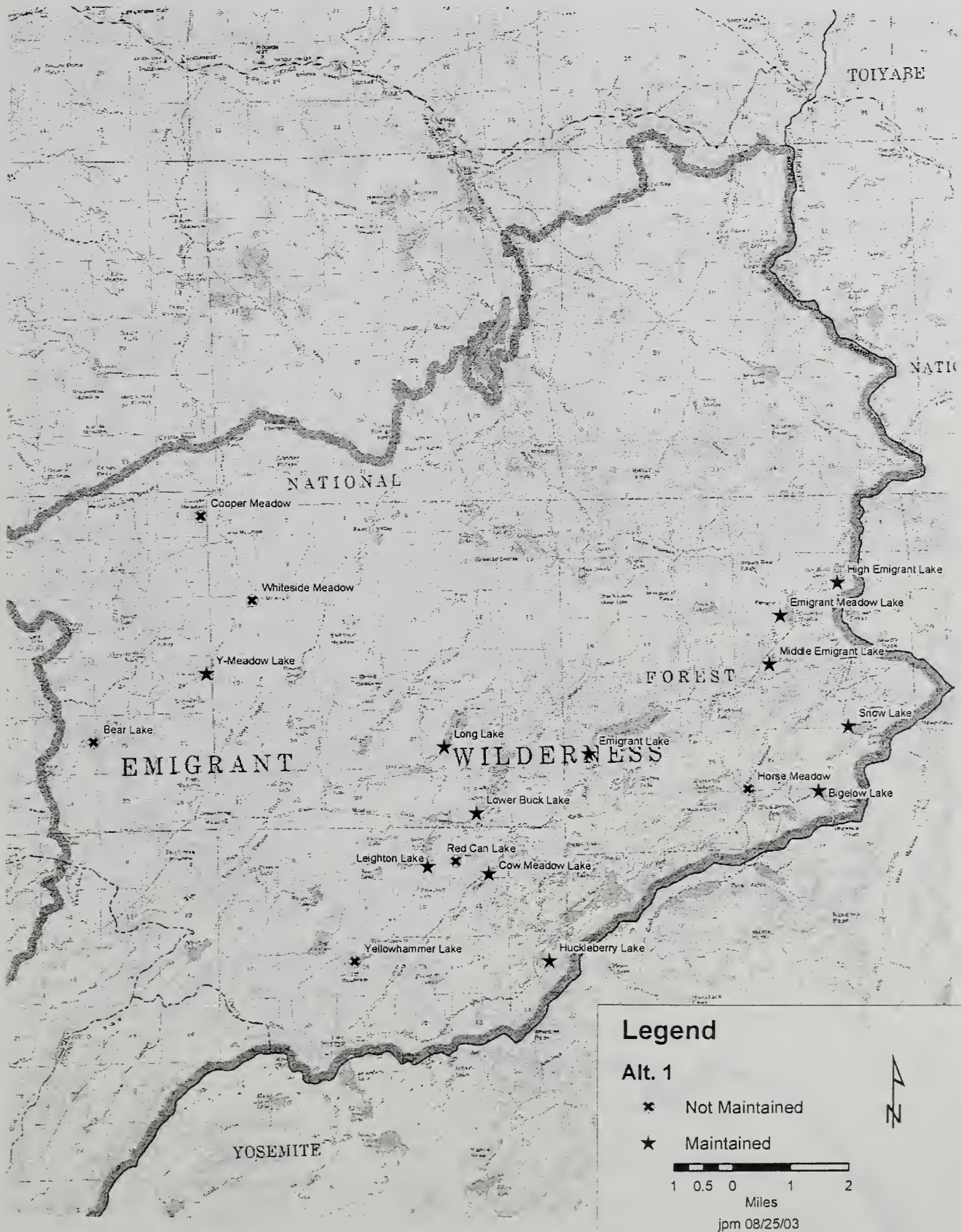
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Map D-1-1 Vicinity Map



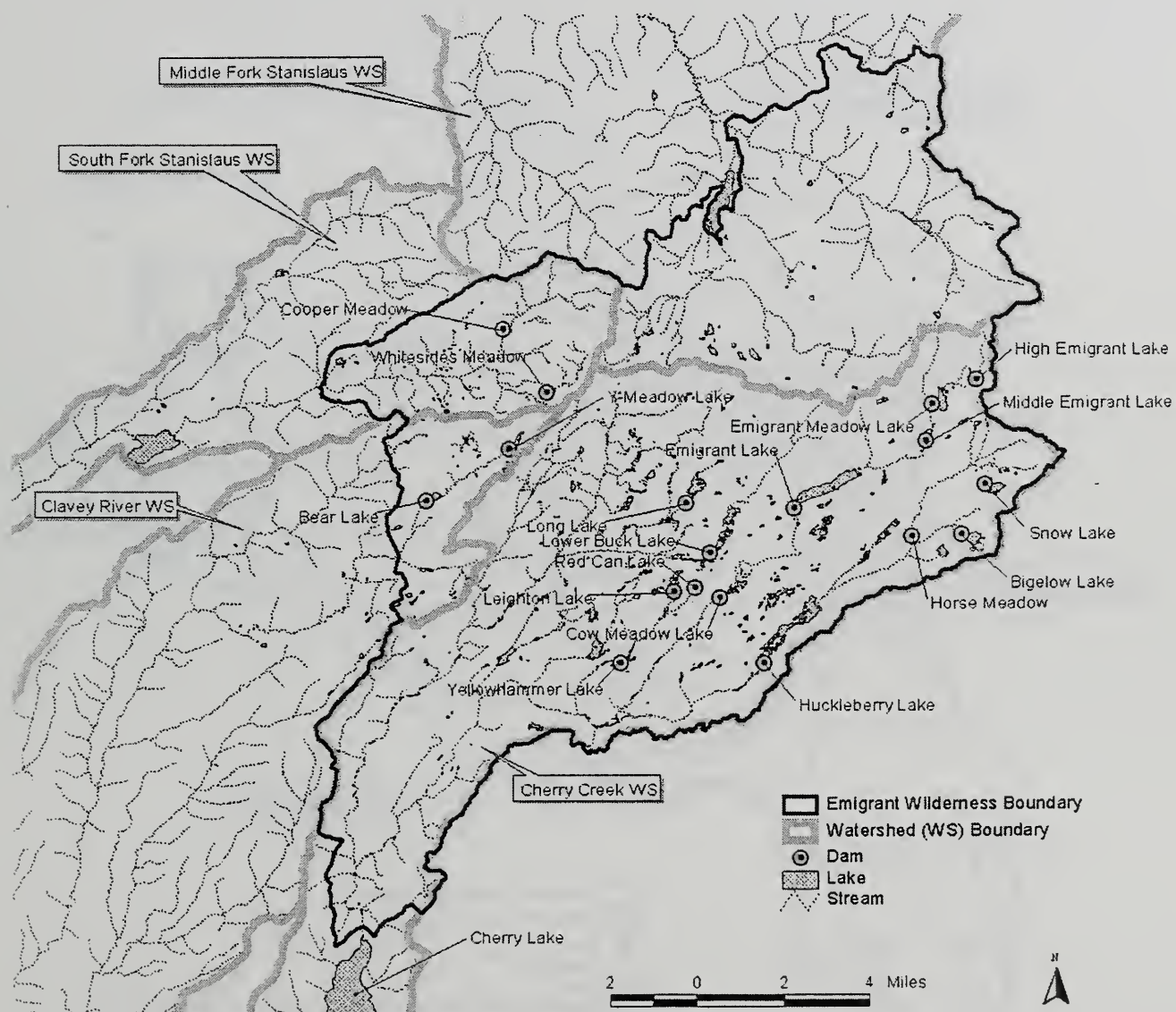
Map D-2-1 Alternative 1



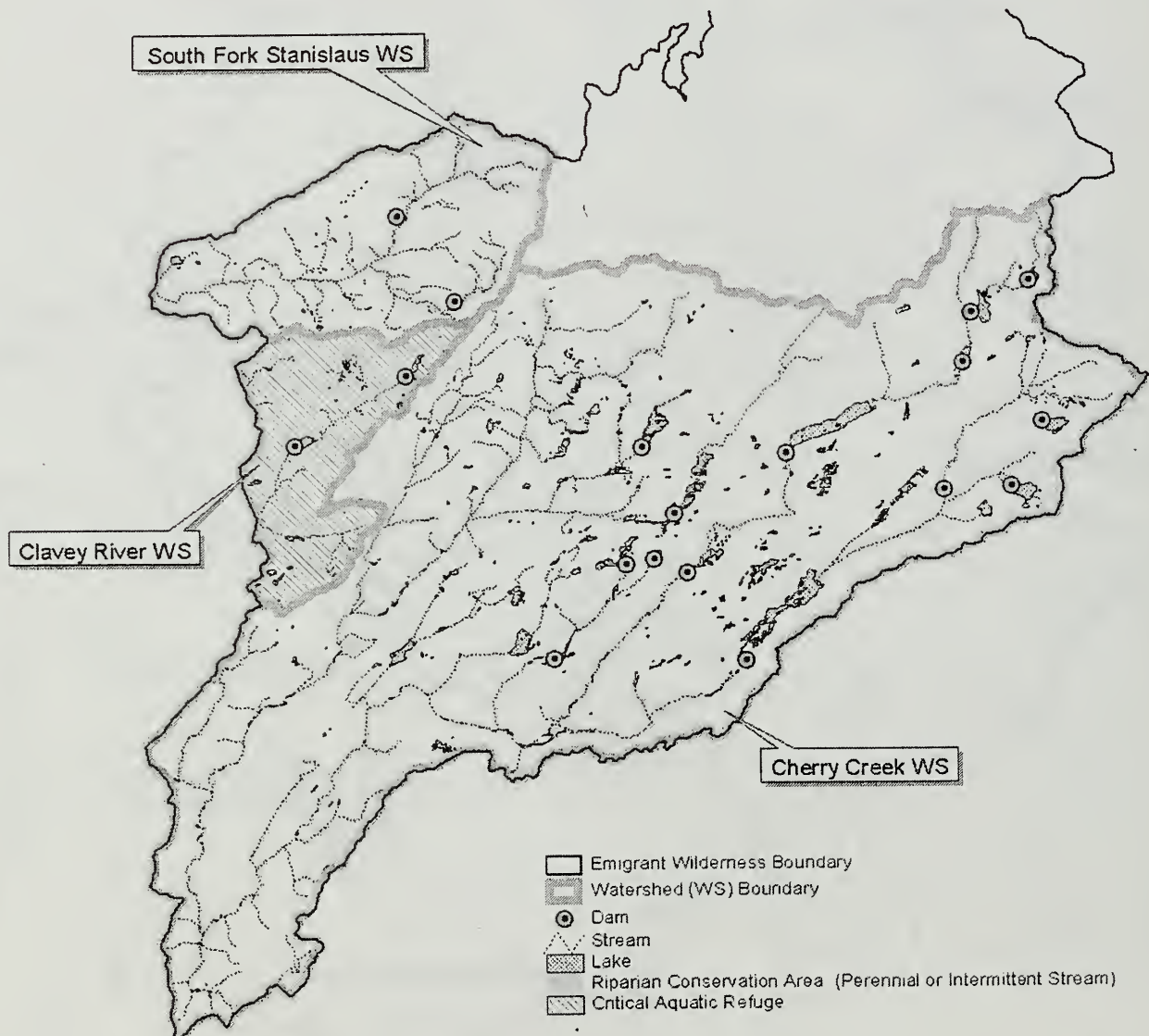
Map D-2-2 Alternative 3



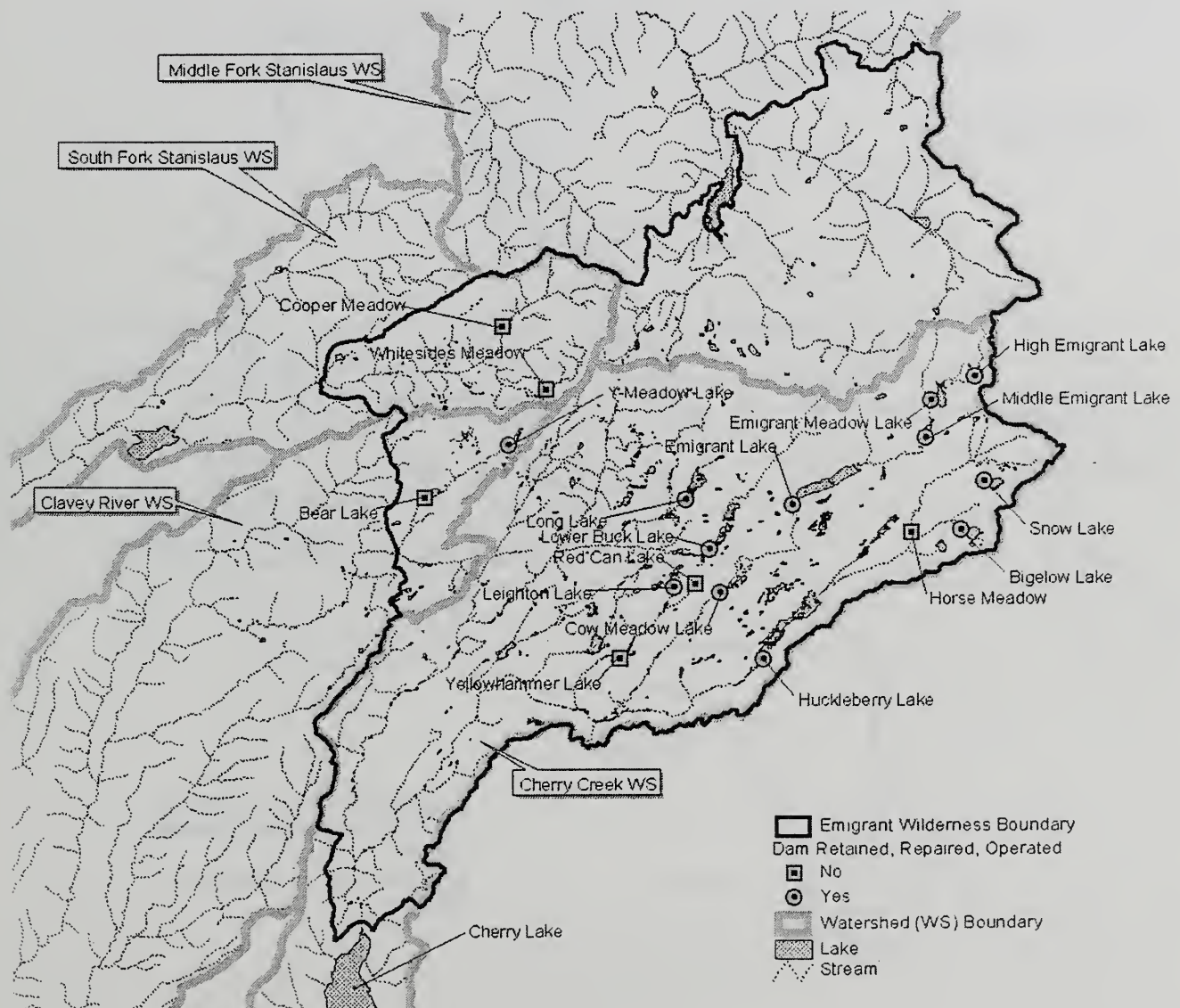
Map D-3-1 Watersheds and Dam Locations



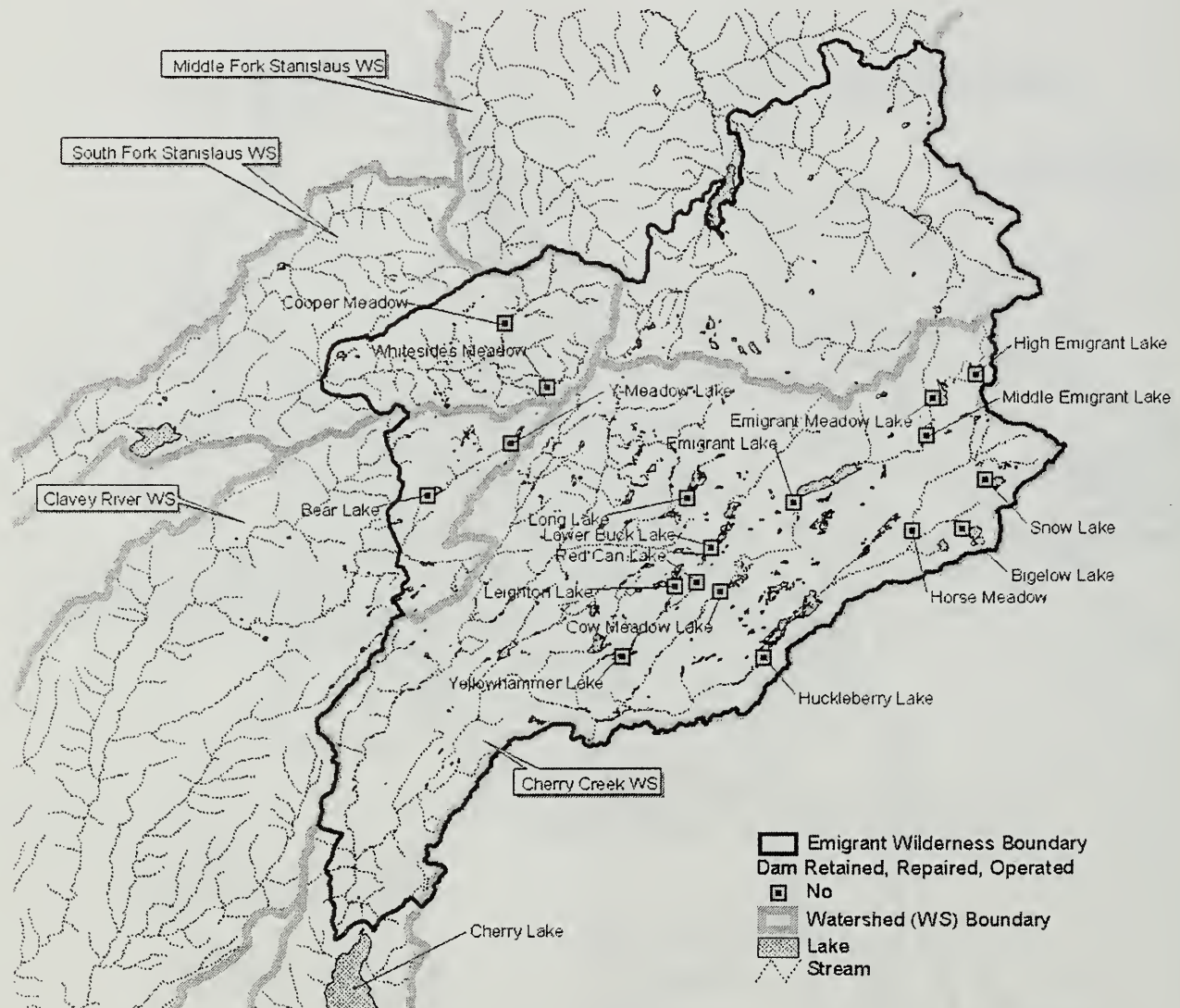
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Map D-3-3 Watershed Effects: Alternative 1



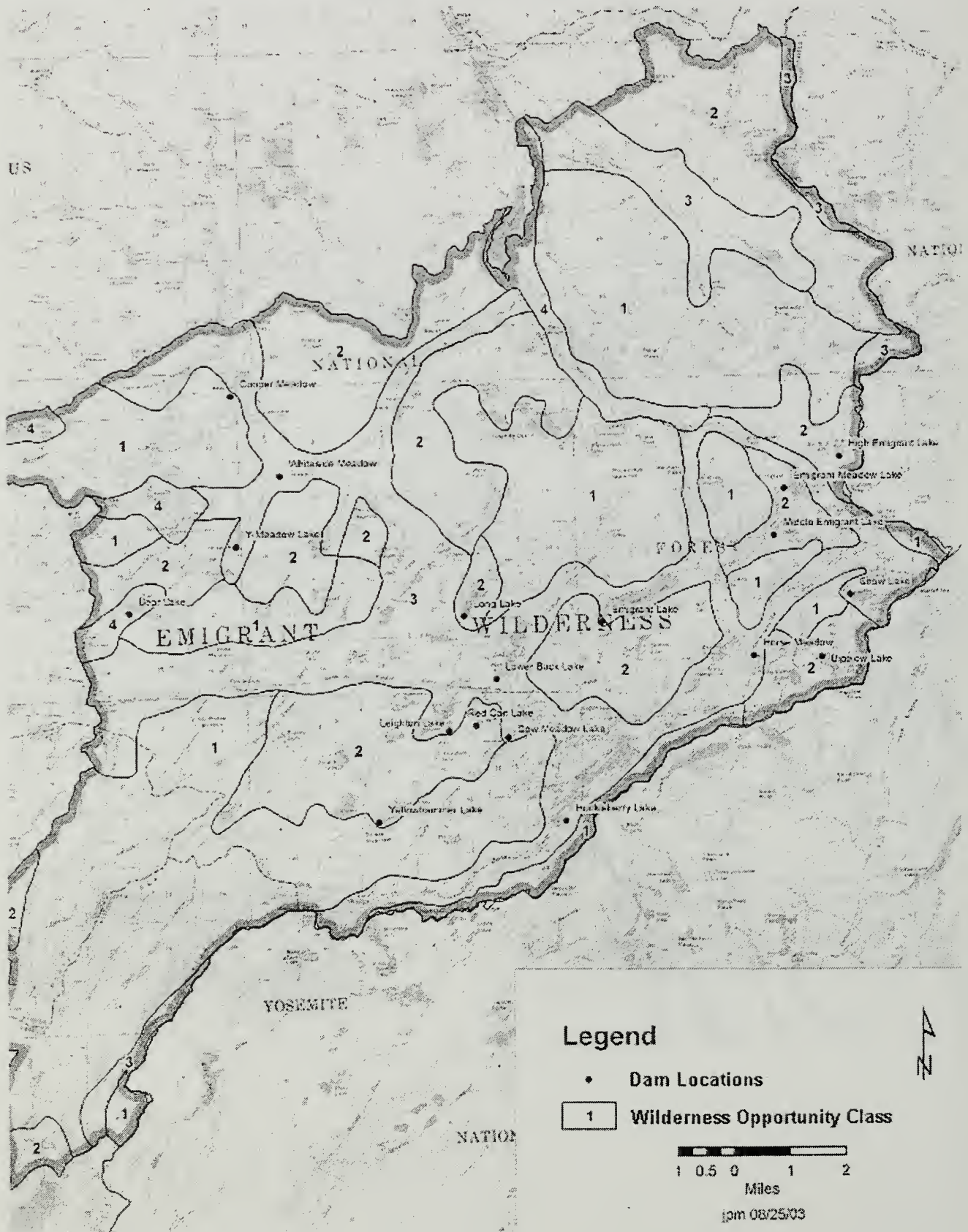
Map D-3-4 Watershed Effects: Alternative 2



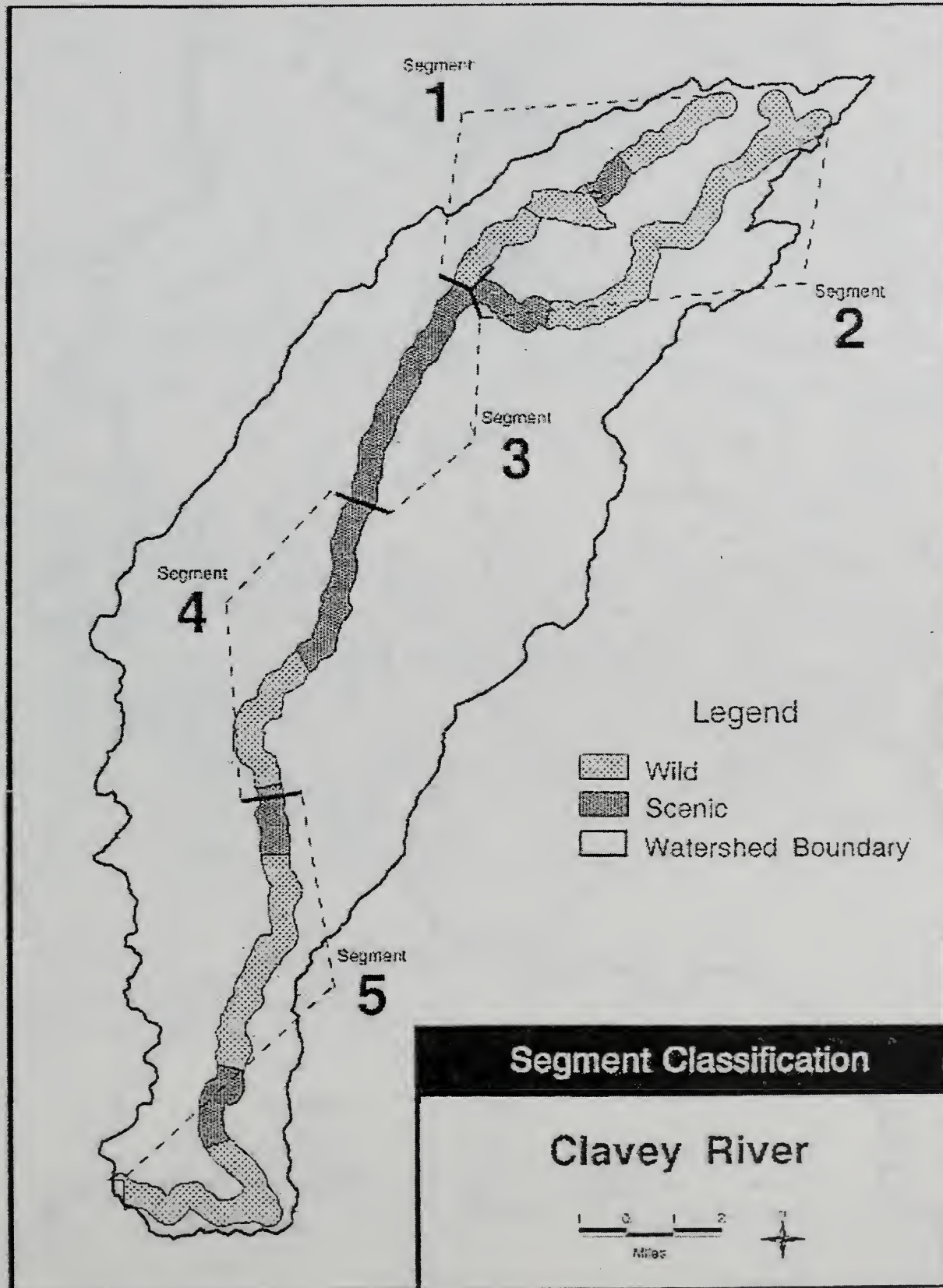
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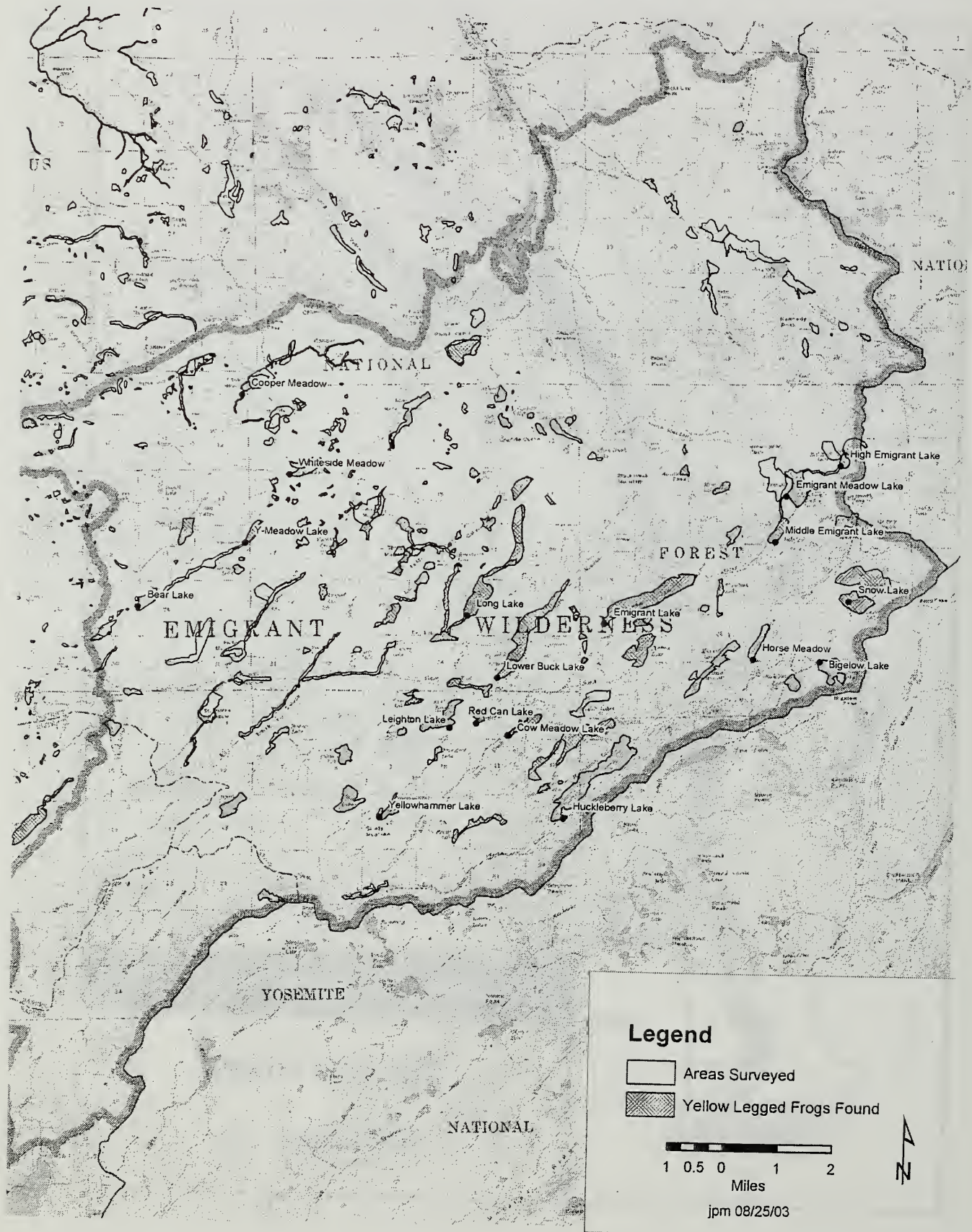
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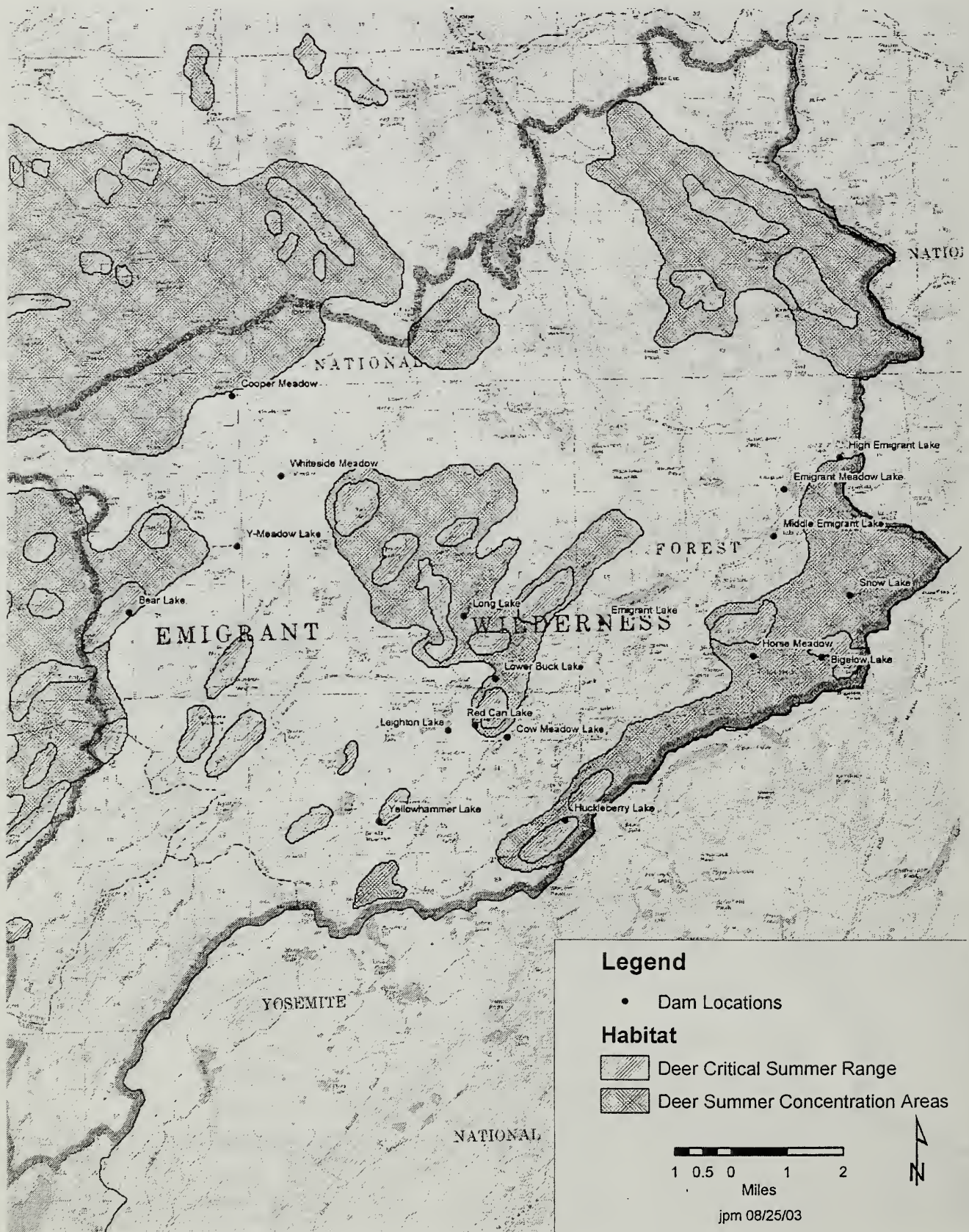
Map D-3-8 Mountain Yellow Legged Frog Occurrences



Map D-3-9 Yosemite Toad Occurrences



Map D-3-10 Mule Deer Distribution



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